DOCUMENT RESUME

ED 451 423 CG 030 684

AUTHOR	Fountain, Douglas; Devine, Patricia
TITLE	Trends among Baseline Admissions to Treatment, 1991-1998: A Case Study from Colorado.
INSTITUTION	Caliber Associates, Fairfax, VA.; National Evaluation Data Services, Rockville, MD.
SPONS AGENCY	Substance Abuse and Mental Health Services Administration (DHHS/PHS), Rockville, MD. Center for Substance Abuse Treatment.
PUB DATE	2000-12-00
NOTE	105p.
CONTRACT	270-97-7016
PUB TYPE	Numerical/Quantitative Data (110) -- Reports - Research (143)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	Comparative Analysis; Databases; Drug Rehabilitation; *Illegal Drug Use; Outcomes of Treatment; Prevention; *Rehabilitation Centers; State Surveys; *Substance Abuse; Trend Analysis
IDENTIFIERS	*Colorado

ABSTRACT

Large, multiyear, state-managed clinical administrative databases provide important tools to inform decision makers about emerging trends in the nation's substance abuse treatment system. Such data can equip decision makers to monitor the responsiveness and efficiency of substance abuse treatment services and identify opportunities for improvement. This report presents an approach to conducting secondary analysis of state-managed clinical administrative and other management data on treatment episodes. It summarizes data on 54,049 clients from Colorado to assess trends in profiles of baseline admissions for clients' first encounters with Colorado's public treatment providers during the period of July 1991 and February 1999. Analyses include client profiles at admissions; treatment duration and completion; drug and alcohol use at treatment exit; and the likelihood that clients will return to treatment. The results revealed that overall success rates and interim drug use outcomes had not changed much in Colorado during the 1990s. About 75 percent had reduced substance use when they left treatment and about 10 percent were readmitted within a year. The report notes that the proportion of clients who were adolescent, female, and Hispanic increased, as well as the proportion of clients citing marijuana use. It suggests that in using this approach in the future, the characteristics and effects of contiguous and non-contiguous treatment admissions, the relationship of detoxification with other treatments, and combining information from other states should also be considered. (Contains 2 appendixes, 25 exhibits, and 35 references.) (JDM)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 451 423

NEDS

NATIONAL EVALUATION DATA SERVICES

TRENDS AMONG BASELINE ADMISSIONS TO TREATMENT, 1991-1998: A CASE STUDY FROM COLORADO

December 2000

CG030684

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☐ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY
R Finkbiner
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
1

CSAT
Center for Substance Abuse Treatment
SAMHSA

CALIBER ASSOCIATES

BEST COPY AVAILABLE

NEDS

NATIONAL EVALUATION DATA SERVICES

TRENDS AMONG BASELINE ADMISSIONS TO TREATMENT, 1991-1998: A CASE STUDY FROM COLORADO

Prepared by

Douglas Fountain, MPA
Patricia Devine, MSW, MPA

Caliber Associates
10530 Rosehaven Street, Suite 400
Fairfax, Virginia 22030
Tel: (703) 385-3200
Fax: (703) 385-3206

December 2000

This document was supported by the Center for Substance Abuse Treatment. Department of Health and Human Services. Caliber/NEDS Contract No. 270-97-7016.

CSAT
Center for Substance Abuse Treatment
SAMHSA

TABLE OF CONTENTS

Page

FOREWORD

ACKNOWLEDGMENTS

EXECUTIVE SUMMARY i

I. INTRODUCTION 1

1. BACKGROUND 1

1.1 Changes in the Substance Abuse Treatment Systems 2
1.2 State-managed Clinical Administrative Data Complement Large Follow-up Studies 5

2. PURPOSE AND ORGANIZATION OF THE REPORT 7

II. METHODS 9

1. DATA USED FOR THIS ANALYSIS 9

1.1 Overview of DACODS 9
1.2 Identifying Unduplicated Clients and Baseline Admission Records 11

2. ANALYSIS METHODS 15

III. RESULTS 18

1. PROFILES OF BASELINE CLIENTS AT ADMISSION 18

1.1 Demographics 19
1.2 Problems at Admission 22
1.3 Substances Used 26
1.4 Relationships Among Trends in Demographics, Problem Substances, and Functional Problems 30

2. TREATMENT EXPERIENCES 33

2.1 Treatment Settings for Baseline Treatment Admissions 33
2.2 Treatment Duration 35
2.3 Completion Rates 40

TABLE OF CONTENTS (CONT.)

Page

3. DRUG AND ALCOHOL USE AT TREATMENT EXIT 42

3.1 Drug and Alcohol Use Outcomes at Treatment Exit 43
3.2 Factors Associated with Drug and Alcohol Outcomes 44

4. LIKELIHOOD THAT CLIENTS WILL RETURN TO TREATMENT 48

4.1 Treatment Re-entry within 12 Months 49
4.2 Survival Analysis of Treatment Re-entry 51

IV. SUMMARY AND LESSONS LEARNED 57

1. SUMMARY AND DISCUSSION 57

1.1 Baseline Client Characteristics 58
1.2 Treatment Setting, Duration, and Completion Status 59
1.3 Drug and Alcohol Use at Treatment Exit 60
1.4 Likelihood that Clients Return to Treatment 61

2. LESSONS LEARNED FROM THIS "CASE STUDY" 63

V. IMPLICATIONS AND NEXT STEPS 66

1. IMPLICATIONS 66

1.1 Implications for Research 66
1.2 Implications for Policy 69
1.3 Implications for Practice 71

2. NEXT STEPS FOR DACODS ANALYSIS 72

2.1 Analysis of Returns to Treatment 72
2.2 Analysis of Detoxification and its Relationship to Treatment 73

REFERENCES 75

APPENDIX A: CREATION OF AN ANALYTIC DATA FILE OF BASELINE TREATMENT ADMISSIONS

APPENDIX B: DETAILED LOGISTIC AND COX REGRESSION TABLES

FOREWORD

The Center for Substance Abuse Treatment (CSAT) works to improve the lives of those affected by alcohol and other substance abuse, and, through treatment, to reduce the ill effects of substance abuse on individuals, families, communities, and society at large. Thus, one important mission of CSAT is to expand the knowledge about and the availability of effective substance abuse treatment and recovery services. To aid in accomplishing that mission, CSAT continues to invest significant resources in the development and acquisition of high quality data about substance abuse treatment services, clients, and outcomes. Sound scientific analysis of this data provides evidence upon which to base answers to questions about what kinds of treatment are most effective for what groups of clients, and about which treatment approaches are cost-effective methods for curbing addiction and addiction-related behaviors.

In support of these efforts, the Program Evaluation Branch (PEB) of CSAT established the National Evaluation Data Services (NEDS) contract to provide a wide array of data management and scientific support services across various programmatic and evaluation activities and to mine existing data whose potential has not been fully explored. Essentially, NEDS is a pioneering effort for CSAT in that the Center previously had no mechanism established to pull together databases for broad analytic purposes or to house databases produced under a wide array of activities. One of the specific objectives of the NEDS project is to provide CSAT with a flexible analytic capability to use existing data to address policy-relevant questions about substance abuse treatment. This report has been produced in pursuit of that objective.

This report presents an approach to conducting secondary analysis of State administrative data on treatment episodes. This report uses data from Colorado to assess trends in profiles of baseline admissions (first encounters in Colorado's public treatment providers), focusing on treatment duration, treatment exit status, drug and alcohol use outcomes, and the likelihood that clients will return to treatment. Future analyses could describe the characteristics and effects of contiguous and non-contiguous treatment admissions, and the relationship of detoxification with other treatment. In addition, by expanding these analyses to include data from other States, policy makers and treatment system leaders could access information on utilization patterns and change in utilization over time at both the State, regional, and, potentially, national levels.

Data used in this report were supplied by the Colorado Alcohol and Drug Abuse Division's (ADAD) client admission and treatment exit record system. This database includes information on more than 400,000 clients admitted to detoxification and 100,000 clients admitted to other treatment services from 1989 to 1999. This report presents data analysis on 54,000 individuals admitted to treatment for the first time in Colorado between July 1991 and February 1999.

Sharon Bishop
Project Director
National Evaluation Data Services

ACKNOWLEDGMENTS

We wish to acknowledge our reliance upon the guidance and direction of Ron Smith, Ph.D., Program Evaluation Branch, the Government Project Officer for the NEDS contract. We also wish to thank Jane Maxwell, Ph.D., and Bruce Mendelson for their valuable and insightful comments on earlier drafts of this paper. We also gratefully acknowledge staff from the Substance Abuse and Mental Health Services Administration (SAMHSA) for their comments and feedback on this report.

We particularly appreciate the willingness of the State of Colorado's Alcohol and Drug Abuse Division to share the DACODS data set with NEDS. Bruce Mendelson in particular has helped us understand the data and has reviewed drafts of this report. We also acknowledge the contributions of Janet Wood, Director of Colorado's Alcohol and Drug Abuse Division, Nancy Brace, and Jan Embree-Bever who all reviewed and commented upon this analysis.

Caliber Associates is the prime contractor for NEDS in partnership with Battelle Centers for Public Health Research and Evaluation (CPHRE); the Lewin Group; and the National Opinion Research Center (NORC). Many individuals within the NEDS team contributed significantly to this report. Doug Fountain and Patricia Devine authored the report. Larry Greenfield, Ph.D., provided invaluable technical guidance and assistance in the conduct of the survival analysis regressions. Ting Shi managed the large and complex DACODS data files and created analytic files. Richard Finkbiner reviewed drafts of this report and managed the NEDS technical report development process. Steve Meserve edited the report, and Krista Candela and other Project Services staff at Caliber produced the final product.

EXECUTIVE SUMMARY

Large, multiyear State-managed clinical administrative databases provide important tools to inform decision makers about emerging trends in the nation's substance abuse treatment system. Such data can equip decision makers to monitor the responsiveness and efficiency of substance abuse treatment services and identify opportunities for improvement. These databases also complement data from outcome studies. The results from analyses of State data plus those from outcome studies would yield improved knowledge about treatment profiles, services, and continuity of services for individuals.

1. INTRODUCTION

This report is the first in a potential series of analyses of State-managed clinical administrative and other management information data to be undertaken by the Center for Substance Abuse Treatment (CSAT) National Evaluation Data Services (NEDS) contract. Using Colorado's Drug and Alcohol Coordinated Data System (DACODS) database, this report summarizes data on 54,049 clients who were admitted for the first time to publicly funded treatment in Colorado between July 1991 and February 1999. This report focuses only on "baseline" treatment experiences of clients in Colorado's public treatment system. Because of the analytic potential of State-managed clinical administrative data and other management information data, no single analysis can address the full range of issues. This analysis is intended as a first step.

This analysis was designed to accomplish two objectives: (1) to assess treatment system experiences and trends in client characteristics, treatment duration, treatment exit, and readmission using data from one State system and (2) to provide a case study of the utility of one State data system in order to inform future State-level data analyses regarding methodologies, and data strengths and limitations.

2. RESULTS

DACODS data reveal that overall success rates and interim drug use outcomes have not changed much in Colorado during the 1990s. Throughout the decade:

- About 42 percent of clients in Colorado successfully completed treatment and 17 percent more had completed at least half of their treatment before leaving.

- About 75 percent of Colorado's clients had reduced substance use and 66 percent had eliminated use by the time they had left treatment.

- About 10 percent of clients were readmitted within a year in Colorado, either to the same or to a different treatment setting.

Among clients entering Colorado's public treatment system, 56 percent reported that admission to be their first ever to treatment, while 44 percent report having had some previous type of treatment (in another State's treatment system or at a private provider that did not contribute data to DACODS). At admission, clients who had been in treatment before were more likely than first timers to be adult, white, and male, to have more treatment-related problems (such as family, legal, physical) or to report daily substance use at admission. At treatment exit, clients who had been in treatment before were more likely than first timers to have reduced substance use at treatment exit (79% vs. 71%) and eliminated use (70% vs. 63%). Few other differences were noted between these groups of clients.

Two-thirds of Colorado's treatment admissions were to Non-methadone Outpatient treatment. The remaining clients went to Intensive Residential (15%), Methadone (8%), Transitional Residential (7%) and Therapeutic Community (3%) settings. Non-methadone Outpatient clients generally had fewer problems than clients in other settings. Non-methadone Outpatient clients also were more likely to report alcohol or marijuana as their primary problem rather than other drugs that were more likely to be reported by clients in residential settings.

Multiyear clinical administrative databases such as DACODS allow for analyses of change over time in client characteristics, treatment duration, and intermediate outcomes within a given State. The following changes in Colorado's treatment system occurred between 1991 and 1998:

- The proportion of clients who were adolescent, female, and Hispanic increased.

- The proportion of clients citing alcohol as their primary problem decreased, while the proportion citing marijuana increased.

- The proportion of clients with three or more problems (family, social, marital, school, work, physical) decreased.

- The likelihood that clients decreased or eliminated drug use declined slightly.

- The likelihood that clients would return to treatment in Colorado declined slightly.

Also between 1991 and 1998, treatment duration declined in Non-methadone Outpatient treatment and Therapeutic Communities, but actually increased slightly for first timers in Intensive Residential and Transitional Residential settings.

Unique client identifiers, together with seven years of data in DACODS, permitted us to analyze treatment readmissions. Survival analyses were used to estimate the likelihood that clients would return to treatment over time. These analyses predict that Colorado will see approximately 20 percent of the baseline clients returning for a second treatment episode within seven years of leaving the first episode, half of whom (10%) will return within a year.

Clients were more likely to have reduced or eliminated substance use *and* were less likely to return to treatment if they had successfully completed their baseline treatment, were relatively older, had fewer problems at admission, and were white (rather than Hispanic or African American). Clients were more likely to reduce or eliminate substance use if they were married, remained longer in treatment, or were in a more intensive treatment setting (e.g., residential rather than outpatient). Moreover, clients were less likely to return to treatment in Colorado if private reimbursement (not public or self-pay) paid for treatment. Clients also were less likely to return to treatment if they reported alcohol or marijuana as their primary problem.

Treatment readmission can be viewed as either a positive or a negative outcome. Readmission to treatment after a relapse to substance abuse is almost always more desirable than not pursuing treatment after relapse. Understanding the relationships between drug and alcohol outcomes and treatment readmission is important for policy and practice.

3. IMPLICATIONS

Implications for research. Future analyses could compare DACODS (or other clinical administrative data) with other data sets to confirm results. Moreover, while DACODS is a very clean and complete data set, some clinical administrative data systems require investment to assure they continue collecting valid and reliable data that can be compared across data systems and tracked over time. Further analysis should then explore the nature and relationships of treatment episodes that sometimes include admissions to multiple levels of care, and the cumulative effects that accrue across multiple episodes. This analysis demonstrated that survival analysis provides robust conclusions regarding readmission rates. Additional survival analyses should be performed with clinical administrative data to compare and contrast results.

Implications for policy. This report provides continued evidence that treatment is effective. Changing client characteristics and needs, however, combined with emerging policy shifts toward managed care, suggest the need to closely monitor effectiveness over time. Declining length of stay noted over the decade may affect post-treatment outcomes. Policies that influence treatment duration should be examined to determine their impact on client retention in treatment and treatment outcomes.

Policy makers should explore whether existing resources are adequate to assure a continued supply of high quality data and analyses of that data. This analysis of DACODS provides evidence of the value of relatively clean and complete data. A further step for investing in data systems would be to accomplish greater data standardization across States, including assignment of unique client identifiers using a common protocol, more commonality among data elements, and standard data reporting protocols regarding treatment exit and services received during treatment.

Implications for practice. Changes in client characteristics may necessitate revisions in treatment provider services and policies. As more Hispanics, women, and adolescents enter treatment, and as other demographics change, treatment providers may need to update their outreach practices, intake procedures, case management services, and approaches to family services. Moreover, treatment readmission protocols may need to be established to address the special needs of returning clients.

Clinical administrative data such as DACODS can answer many questions about our nation's treatment systems and change in these systems over time, but also have limitations.

- Interim outcomes noted could change after clients leave treatment. They may also re-enter treatment in private providers or providers in other States. Accordingly, these data would ideally be analyzed in conjunction with follow-up outcome data.

- This analysis did not have information available regarding the cost, intensity, or types of services offered by Colorado's public funded treatment providers. Therefore, the analyses focused on who enters and who exits substance abuse treatment.

Where this analysis of DACODS differs from previous treatment studies is that it allows *several episodes to be linked together*. Again, the impact of such linked treatment episodes needs to be assessed using long term follow-up data. This report initiates such long-term analysis, focusing on a client's first treatment encounter in Colorado. Proposed subsequent analyses could take this analysis farther.

I. INTRODUCTION

I. INTRODUCTION

Federal, State, and local authorities, as well as private payors and treatment providers, manage thousands of information systems that receive and house data on clients who seek, obtain, and exit substance abuse treatment, as well as data about the treatment providers, services, and costs. Millions of clients and thousands of treatment providers are reflected in these systems. Together, these information systems constitute a largely untapped reserve of data that can be used for substance abuse treatment research, policy, and practice.

This report on the Colorado Drug Abuse Coordinated Data System (DACODS) is the first analysis of State-managed clinical administrative data to be completed by the Center for Substance Abuse Treatment (CSAT) National Evaluation Data Services (NEDS) contract. The overall intent of this analysis is to augment existing knowledge regarding treatment client characteristics and service utilization and to develop an approach to support future analyses of other State-managed clinical administrative data. This chapter describes the background for the analyses and describes the purpose and organization of the report.

1. BACKGROUND

Information is needed to answer questions about patterns and trends in client characteristics, treatment services, client outcomes, and client re-admissions. Typically, large research and evaluation efforts are funded to generate statistically sound data on client profiles, treatment experiences, and treatment outcomes in order to determine treatment effectiveness for given populations. These data are frequently lacking detailed information about treatment experiences.

In addition to substance abuse treatment research and evaluation data, other data sources are generated as part of the treatment process. These data may be captured by the local substance abuse treatment provider for management and administrative purposes and/or collected to support program monitoring and accountability in accordance with county, State, and Federal reporting requirements. These "administrative data" are potentially valuable sources of information about client characteristics, client flows, treatment processes, and clinical interventions.

To fully address broad questions about patterns and trends in treatment services, a combination of comprehensive multiyear research/evaluation follow-up data and administrative

services and cost data, in juxtaposition with State and national data on the treatment systems, is required. To date, no single data source supplies all of this information. Therefore, the CSAT NEDS analysis team obtained the Colorado DACODS databases for the years 1991 through 1998 to explore the utility of the State data in filling information gaps. The NEDS approach to the analysis was governed by two objectives:

- Analyze the Colorado public treatment system experiences in terms of patterns and trends in client characteristics, treatment duration, treatment exit, and treatment re-admissions
- Provide a "case study" of the utility of one State treatment data system in order to inform future State-level data analyses in terms of methodologies, data strengths, and data limitations.

The remainder of this section provides context for the DACODS analyses in terms of changes to the public substance abuse treatment system nationally and within Colorado, and to demonstrate the utility of State data to augment national substance abuse treatment research and evaluation data and findings.

1.1 Changes in the Substance Abuse Treatment Systems

For some clients, a single exposure to treatment can produce lifelong changes. For others, several attempts at treatment are needed to sustain intended effects. For any given individual, drug and alcohol problems often wax and wane, and the shifting patterns of clients' clinical needs may necessitate different levels and types of interventions over time.

Against such a backdrop, advocates, policy makers, and many other stakeholders have challenged the substance abuse treatment field to improve responsiveness to client needs and increase the efficiency of treatment services. Several policies enacted at the Federal, State, and local levels over the past decade were intended to stimulate access to treatment among targeted populations, to match clients to the most appropriate treatments, and to reward financial efficiency achieved through improved management by treatment providers. Public sector managed care initiatives, welfare reform initiatives, and an increased emphasis on outreach to target populations and underserved groups are a few examples of such initiatives. The following paragraphs summarize the changes to the publicly funded substance abuse treatment system, nationally, and the similar changes experienced in Colorado.

Change in Treatment Systems During the 1990s

Substance abuse, mental health, health, criminal justice, and welfare systems nationwide changed considerably during the 1990s. Service systems adapted to the changing needs among clients, such as improving upon services for persons affected by HIV/AIDS or who have co-occurring psychiatric disorders. State and local agencies introduced cost-savings strategies such as the use of managed care and extension of utilization review by many public sector treatment systems. Federal, State, and local systems also implemented performance monitoring systems to check compliance with Federal regulations, and to monitor the process and outcomes of treatment.

Federal, State, and local treatment systems also launched efforts in the 1990s to improve access to treatment for particular target population groups. For example, in 1992 the redesigned Substance Abuse Prevention and Treatment Block Grant required that pregnant women, women with children, and injection drug users be granted priority for admission (see the Federal regulation, 45 CFR 96.131). Other reforms over the decade included integration of substance abuse treatment into criminal justice systems. Most recently, welfare reform has created new outreach opportunities for welfare recipients with substance abuse problems to obtain treatment that may improve their employability.

Several national treatment analyses have already documented changes in client characteristics and declines in the amount and types of services provided to clients over the past decade (Craddock et al., 1997; Etheridge et al., 1997). For example, Craddock and her colleagues (1997) compared the Drug Abuse Treatment Outcome Study (DATOS) of the early 1990s with the Treatment Outcome Prospective Study (TOPS) completed a decade earlier. They found that polydrug use declined, but cocaine use increased among clients in long-term residential settings. Full-time employment, suicidal ideation, and predatory crime all declined during the decade. Etheridge et al. (1997) also used DATOS and TOPS to conclude that the number and intensity of services declined while treatment philosophies changed.

Some of the changes in treatment services were in response to shifting trends in client characteristics and demands. D'Aunno and his colleagues studied outpatient treatment settings with surveys conducted in 1988, 1990, and 1995. They concluded that outpatient services declined from 1988 to 1990, but that client requirements for services may also have declined (D'Aunno and Vaughn, 1995). D'Aunno, Vaughn, and McElroy (1999) subsequently found that

HIV services increased among clients in agencies where clients had more risk factors and the agencies had more resources and organizational support for those services.

Cost savings and financial pressures drive change in substance abuse treatment, as in all health delivery systems. A comprehensive review of changes in substance abuse and mental health treatment delivery systems was completed in 1998 by the Alcohol Research Group (Schmidt, Piroth, and Weisner, 1998). These authors identified several trends:

- Treatment shifted toward lower-intensity modalities (e.g., outpatient in lieu of residential) from 1982 to 1994 as a result of pressure from funding bodies.
- Treatment also has shifted toward a medical-model orientation and a convergence between mental health and substance abuse treatment strategies.

Provider ownership and funding also affected the likelihood that specific providers would change. For example, directly funded single-source providers changed less than providers with diverse funding bases.

Changes in the Colorado Treatment System

Colorado's own series of changes mirror those observed nationwide. Colorado implemented managed care in 1997 and brought about other administrative changes within the Single State Agency (SSA) to increase oversight and improve quality. Colorado divided the State into regions and, in 1997, began purchasing treatment services from, and delegating some oversight responsibilities to, Management Services Organizations (MSOs). A legislative audit led to several administrative changes in the division that altered the oversight provided to regions. Some changes affected data submission and data quality, as discussed in Chapter II.

Change will continue in Colorado. Colorado has experienced rapid growth, having the nation's third highest growth rate, with a 20 percent increase in population between 1990 and 1998 compared to 9 percent increase nationwide. Colorado may see its population swell another 13 percent from 1998 to 2005, particularly among racial/ethnic minorities (U.S. Department of Commerce, 1999).

1.2 State-managed Clinical Administrative Data Complement Large Follow-up Studies

A case study of how State-managed clinical administrative data can augment findings from existing research and evaluation treatment studies is provided in this report. Clinical administrative data here refers to routinely recorded data elements on a population of clients entering and leaving treatment (Institute of Medicine, 1990). State-managed clinical administrative data are defined here to include those client-oriented data systems operated by the nation's SSAs that purchase, regulate, and study substance abuse services. Other State data exist, such as finance and reimbursement systems; some State data systems also include client follow-up data.

The treatment field has benefitted from many high quality national research and evaluation treatment follow-up studies that have documented the characteristics of treatment clients as they enter treatment, the services they receive, and the outcomes they achieve following a treatment episode (Hubbard et al., 1989; Gerstein et al., 1997; Hubbard et al., 1997). Analysis of State-managed clinical administrative data can augment prior treatment studies by:

- Providing information on how clients move in and out of treatment over time within a treatment system
- Clarifying relationships between repeated treatment exposure and long-term outcomes
- Expanding analyses of national data systems such as the Treatment Episode Data Set (TEDS)
- Providing sampling frames for specialized follow-up studies
- Providing a basis for generating population estimates to determine the impacts of substance abuse treatment.

State-managed clinical administrative data also augment national or State-level research and evaluation follow-up studies because the large client populations contained within State-managed administrative systems enable subgroup sampling and analysis. Where follow-up studies often collect a wealth of information on a relatively few scientifically sampled clients, State-managed clinical administrative data often provide limited data on a broad population of clients.

Some State-managed clinical administrative data have analytic limitations. These limitations result in part from a lack of the following types of information:

- Comprehensive assessments of overall client functioning, in part because such information is often difficult to codify in a brief array of categorical data elements
- Elements of clinical work, including services provided, clinical notes, and information on clinicians who deliver the services
- Contextual "background" such as community substance abuse patterns, funding, and other policy factors that can help explain emerging trends in treatment.

State-managed clinical administrative data nonetheless provide at least a partial shared clinical database that can be compared and contrasted across providers, across modalities of care, and over time.

Two State-level research follow-up studies demonstrate how State-managed clinical administrative data have been used in conjunction with other data. In California, Gerstein et al. (1994) selected a representative sample of treatment providers and clients using State-managed data. These clients were then interviewed 12 months following treatment. The client outcomes were then weighted and projected to the entire California publicly funded treatment population. In Oregon, Finigan (1996) used State-managed clinical administrative data to identify substance abuse treatment clients and to match their treatment records with State-level criminal justice, health, and employment services data. He assessed outcomes by comparing pre-treatment and post-treatment utilization of services.

Analyses of State-managed clinical administrative data sets have generally been idiosyncratic to the States that supplied the data, though future development of cross-state data standards may improve the comparability of data. The elements and data collection protocols underlying our nation's State-managed clinical administrative data bases vary across types of treatment providers, across States, and change over time. Efforts are underway within the Federal government to standardize data elements:

- SAMHSA's Drug Abuse Services Information System (DASIS) includes the Treatment Episode Data Set (TEDS, Office of Applied Studies, 1999). TEDS includes standard data elements now reported by all States on clients at admission, and by some States on clients at discharge.
- CSAT developed the Integration Evaluation Methods "tool kit" to assist efforts to standardize and improve upon data quality. The IEM includes concept papers (Devine, 1999), core data lists (Caliber Associates, 1999a) and technical assistance guides.

Some States are also working to establish common data definitions that cut across substance abuse, mental health, and other service sectors (NASADAD, 1996).

The effectiveness of substance abuse treatment services has been well documented by more than 30 years of treatment research and evaluation. Additional information on admissions, treatment exit, and treatment re-entry is needed to augment existing treatment studies in order to identify the characteristics of the most effective services (Battjes, Onken, and Delaney, 1999). Recently, the NEDS Expert Panel endorsed an analysis plan calling for more analysis of treatment factors that help predict outcomes (Caliber Associates, 1999b).

Analysis of State-managed clinical administrative data could tap a reservoir of information useful for understanding the issues and trends in substance abuse treatment. This type of data is well suited to help identify patterns and emerging trends in client characteristics, treatment services and duration, intermediate outcomes (e.g., status at treatment exit), and treatment readmission. This report presents the NEDS analysis of one State data system. The following section provides the purpose and organization of this report.

2. PURPOSE AND ORGANIZATION OF THE REPORT

The primary purpose of this report is to present preliminary evidence on the changing nature of clients entering and exiting one State's publicly funded treatment system. Using Colorado's alcohol and drug treatment State-managed clinical administrative database, this report identifies emerging trends in treatment service utilization and the characteristics of clients as they enter and leave treatment. The key analysis questions addressed in this report are:

- What were the characteristics of clients entering care for the first time in Colorado's public system as well as the first time anywhere (e.g., their "baseline" treatment experience)? How have these characteristics changed over time?
- What type of treatment experience did clients have for their baseline experience in Colorado, how long did it last, and what was their status at treatment exit? How have these patterns changed over time?
- How did Colorado clients' substance use patterns change by the end of treatment? What factors are associated with reduced or eliminated substance use? How have these patterns changed over time?

- What was the likelihood that clients in Colorado would return to treatment in Colorado after treatment exit? What factors are associated with readmission? How have these patterns changed over time?

This report also demonstrates an analysis pian that might be replicated in other States with comparable data from other States. Extending this analysis to other States would allow analysts to determine whether Colorado's trends are similar or dissimilar from those of other States and regions.

The report is organized within five chapters. Following the introduction (Chapter I), a description of the methods used for the analyses, including a more detailed description of the DACODS databases, is presented in Chapter II. Chapter III provides the results of the analyses, including: (1) profiles of clients at admissions, (2) treatment duration and completion, (3) drug and alcohol use at treatment exit, and (4) likelihood that clients will return to treatment. A summary and discussion of the analytic findings together with "lessons learned" from the Colorado DACODS case study are presented in Chapter IV. The report concludes with Chapter V, including an identification of the implications of the analyses for research, policy, and practice and a discussion of possible next steps in DACODS analysis.

II. METHODS

II. METHODS

In 1999, the State of Colorado volunteered to provide a copy of its DACODS database to the Center for Substance Abuse Treatment's NEDS contract. Colorado and NEDS sought jointly to explore the database for lessons regarding clients who were admitted to and exited from Colorado's publicly funded drug and alcohol abuse treatment system, and how these changed over time. This section describes the DACODS data. Appendix A includes a detailed discussion of how the data were selected to create a final analytic data file of baseline treatment admissions. The DACODS analysis file used for this report is very large compared to other substance abuse treatment databases, with data on treatment provided to more than 54,000 baseline clients admitted over a 7½-year period. As such, this analysis documents trends and patterns, and explores these in enough depth to generate statistically sound conclusions.

1. DATA USED FOR THIS ANALYSIS

DACODS collects information at intake and treatment exit for all clients from Colorado's publicly funded treatment providers. DACODS contains data on all clients who entered treatment from 1980 through present day. This section describes the data that comprise DACODS and the steps taken to create an analysis file.

1.1 Overview of DACODS

DACODS obtains data from publicly funded service providers in Colorado's substance abuse treatment system. The types of treatment settings include Detoxification, Therapeutic Communities, Intensive Residential, Transitional Residential, Methadone, and Non-methadone Outpatient treatment settings. This report focuses only on admissions to rehabilitation-oriented treatment settings. CSAT considers detoxification services to serve a different purpose than rehabilitation-oriented treatment services, and hence the detoxification treatment setting was not included in this analysis.

Colorado's Alcohol and Drug Abuse Division provided the following descriptions of the five rehabilitation-oriented treatment modalities that are the focus of this report.

- Therapeutic Communities provide long-term, highly structured residential treatment, 24 hours/day, 7 days/week, for persons whose chronic substance abuse and social or other dysfunction (e.g., poor impulse control, antisocial behavior and extensive involvement with the criminal justice system) necessitate a confrontive environment that focuses on behavioral change.

- Intensive Residential treatment is offered to chemically clear persons who are significantly substance abuse impaired, have previous treatment failures in less intensive settings, lack social support systems and/or require specialized treatment in a highly structured environment.

- Transitional Residential treatment provides services in a residential setting of 1 to 10 contact hours per week. Clients may be transitioning to or from a higher or lower intensity of services. Clients generally live in these facilities while continuing normal daily activities such as work.

- Methadone Outpatient treatment, often referred to as opioid replacement treatment, provides narcotic treatment and supportive services in an outpatient or specially designated residential setting for persons whose opiate addiction and high-risk behaviors necessitate a daily dose of an approved controlled substance to prevent withdrawal symptoms, reduce psychological and physical craving, and reduce the danger of the consequences connected with high-risk behavior, including HIV exposure.

- Non-methadone Outpatient treatment settings provide the least restrictive treatment environment for persons who require substance abuse treatment. Frequency and intensity of therapeutic contact vary, but at minimum are one contact per 30 days. Outpatient providers may evaluate substance abuse and substance related issues among clients not currently admitted for care but referred to the agency.

The Evaluation and Information Services Section of the State of Colorado's Alcohol and Drug Abuse Division is responsible for maintaining the DACODS system, but, in turn, relies on regular compliance by funded treatment providers in submitting intake and treatment exit data forms. The State agency also has sponsored post-treatment follow-up data collection, but those data were not available for this analysis.

Two major improvements a decade ago strengthened the database and increased comparability with other States. First, in 1987, a standard and unique client identifier was implemented to help track clients over time. Second, DACODS was modified somewhat in 1990-1991 to comply with the Federal government's Client Data System (CDS).[1]

[1] CDS was the forerunner of the Substance Abuse and Mental Health Administration's (SAMHSA's) Treatment Episode Data System (TEDS). TEDS includes mandatory and supplemental data elements on clients entering treatment in publicly funded treatment providers, and includes a pilot test of treatment exit data elements for clients who leave treatment. Provider-level information is collected in the National Survey of Substance Abuse Treatment Services (N-SSATS), formerly the Uniform Facility Data System (UFDS). The TEDS and N-SSATS together comprise the Drug Abuse Services Information System (DASIS).

In July 1997, Colorado altered how DACODS data are processed and transmitted. The catalyst for these changes was Colorado's statewide implementation of managed care for substance abuse treatment services. Colorado standardized the client identifiers,[2] implemented electronic submissions of data, and required treatment providers to submit data through the newly formed Managed Service Organizations (MSOs).

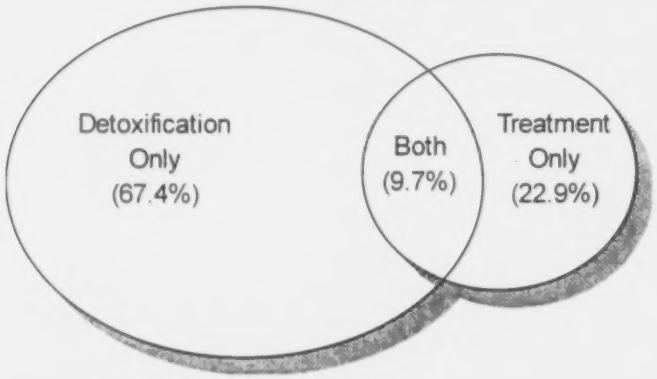
1.2 Identifying Unduplicated Clients and Baseline Treatment Admission Records

Colorado's Alcohol and Drug Abuse Division prepared a file of intake and treatment exit records for the NEDS analysis team that included data from January 1989 through February 1999. This file consists of all clients who were admitted to detoxification, treatment and other special services during this period. Out of 509,089 records submitted to NEDS, 505,210 records had valid unique identifiers and were not duplicate records.

Some of the clients admitted to treatment, detoxification, or both during the 1990s were admitted only one time, while others had two or more admissions. The 505,210 admissions during the 1990s represented 217,382 unduplicated clients. This means that all clients had an average of 2.3 admission records on file in the Colorado system during the 1990s. Of the 217,382 unduplicated clients, 67 percent were admitted only to detoxification/other services, 23 percent were admitted only to treatment, and 10 percent were admitted to both types of care (Exhibit II-1).

[2] Colorado standardized the collection of information for connecting treatment records to include name and Social Security number in lieu of prior anonymous identifiers.

EXHIBIT II-1
DISTRIBUTION OF UNDUPLICATED CLIENTS WHO RECEIVED ONLY DETOXIFICATION, ONLY OTHER TREATMENT, OR BOTH DETOXIFICATION AND OTHER TREATMENT

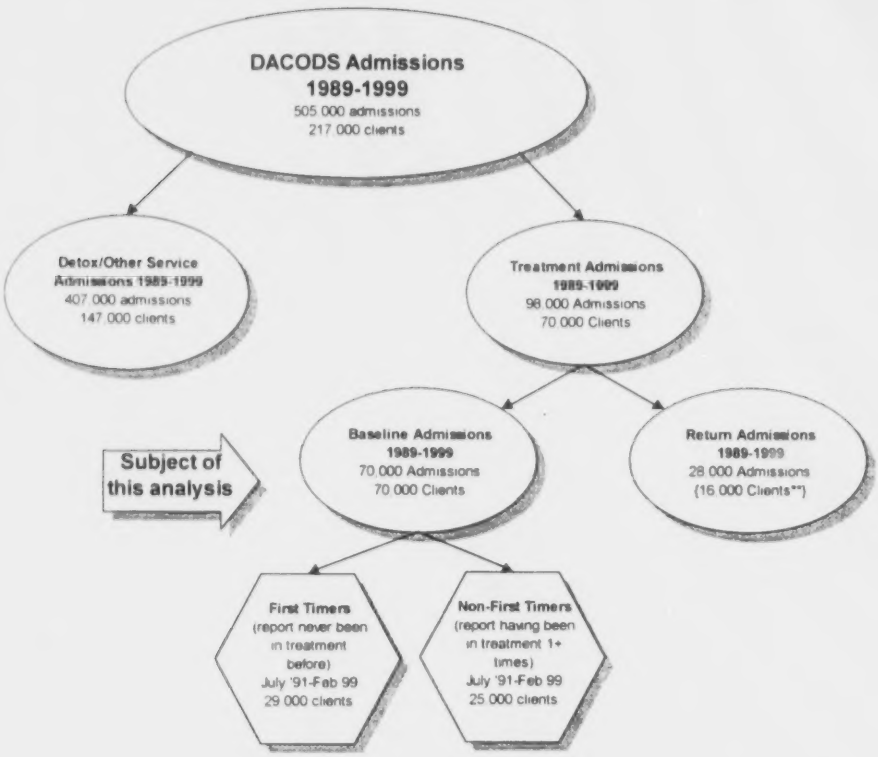


Note: Data are based upon 217,382 unduplicated clients who were admitted between January 1989 and February 1999. Clients with single or multiple admissions to detoxification, but never to other public treatment services in Colorado, are considered detoxification only. Clients with single or multiple admissions to treatment providers but never to detoxification care are considered treatment only. Remaining clients had at least two admissions in the DACODS system, at least one each to detox and treatment.

The treatment admission records were divided and analysis files created. The following sequence illustrates the decision rules used to create the analysis files (numbers are rounded for illustration only, as presented in Exhibit II-2). First, from more than 500,000 admission records to detoxification and rehabilitation-oriented treatment filed between January 1989 and February 1999, the 100,000 rehabilitation-oriented treatment records were selected. Second, from approximately 100,000 treatment records, 70,000 "baseline" or first treatment admissions to Colorado's publicly funded treatment were selected. Third, from approximately 70,000 "baseline" encounters admitted between January 1989 and February 1999, the 54,000 clients admitted after July 1, 1991, were selected to take advantage of several additional data elements added that year.

The next sections summarize the distinction between baseline clients with and without some other prior treatment experience, and the proportion of baseline admissions who had treatment exit records filed by the end of the analysis period.

EXHIBIT II-2
SUMMARY OF HOW DACODS DATA WERE SUBSET FOR THIS ANALYSIS



Note: Figures are rounded to thousands to facilitate the illustration. Baseline admissions to Colorado's publicly funded treatment providers between July 1991 and February 1999 are included in this analysis. ** The "Return Admissions" represent 16,000 clients who also have returned to care. In other words, of the 70,000 treatment clients analyzed, 16,000 of them had a second admission record on file. Their admission records were processed as a separate database.

Previous Treatment Experience Among Colorado's "Baseline" Admissions

Colorado's DACODS database includes clients who are entirely new to the treatment system in Colorado and clients who have had one or more treatment encounters previously within Colorado or elsewhere. Prior treatment experience is important for understanding the clients, their needs, and how they access and progress through a current treatment episode. Accordingly, the rest of this report generally presents separate analyses for first timers and non-first timers.

BEST COPY AVAILABLE

Overall, 44 percent of baseline admissions reported they had previously been in treatment: 26 percent reported one prior treatment and 18 percent reported having had two or more prior experiences. **Clients with no prior treatment experience are called "first timers" for this report and clients with one or more prior treatment experiences are called "non-first timers" for this report.** These data are based on whether clients reported having one or more prior treatment encounters before the current admission. Valid and non-missing data on this variable were available for 95 percent of admissions.[3] The proportion of clients reporting prior treatment experience varied significantly by modality.

Some non-first timers may have been Colorado clients from the 1980s or earlier who returned to care. If they were returning from earlier episodes, one would expect to see a disproportionately higher proportion of non-first timers earlier in the decade than later. Analysis of the proportion of non-first timers entering treatment during the early decade did not, however, indicate that a disproportionately high share of non-first timers entered treatment early in the decade as opposed to later. [4]

Non-first timers who were not seen in the publicly funded system may have been seen in any number of possible settings. These settings include private for-profit treatment providers, mental health or other public agencies that are not part of the public substance abuse treatment system, or in private offices of independent practitioners such as physicians, social workers, and counselors.

The final analysis file used for this report therefore includes 54,049 baseline admissions to treatment in Colorado between July 1, 1991, and February 28, 1999. The number of admissions per year and the number and proportion of admission records with matching treatment exit data are presented in Exhibit II-3. The number of baseline admissions to treatment ranged from a high of 7,698 in 1993 to a low of 6,600 in 1997.

---

[3] Some clients who report no prior treatment in fact have had previous treatment. A separate data file of *second* admissions to treatment during the decade was analyzed, where, by definition, all admissions recorded in that database had been in treatment in Colorado before that admission. Among those admissions, 20 percent reported having had *no* prior treatment. Either the data misrepresent the clients, or the clients do not count themselves as having been treated, or the providers misconstrued the variable and only asked about prior treatment at *that* provider.

[4] The original DACODS data file also includes admissions for 1989-1999. Only clients' first admissions after July 1991 are analyzed in this report, but the data file had already been subset to exclude any return admission from 1989 through 1991. Therefore these non-first timers are not readmissions from the 1989-1991 period.

Matching Discharge Records to Admission Records

Matching treatment exit data were available on 74 percent of the 54,049 clients, or 40,183 treatment exit records (Exhibit II-3). From 1991 through 1995, treatment exit data were available for 88 percent of baseline treatment admissions in Colorado. Treatment exit data response rates tapered off in 1996 and then dropped off dramatically by 1997 to 48 percent and in 1998 to 41 percent.[5]

EXHIBIT II-3
BASELINE TREATMENT ADMISSIONS AND MATCHING TREATMENT EXIT RECORDS ANALYZED, BY YEAR

Admission Year	Total Admission Records	Matching Treatment Exit Records Filed by February 28, 1999	Percent with Matching Treatment Exit Record Filed by February 28, 1999
1991 (July-Dec)	3,762	3,360	89.3%
1992	7,574	6,724	88.8%
1993	7,698	6,639	86.2%
1994	6,559	5,827	88.8%
1995	6,818	5,987	87.8%
1996	6,809	5,393	79.2%
1997	6,595	3,142	47.6%
1998	7,133	2,943	41.3%
1999 (Jan-Feb)	1,101	168	15.3%
Total	**54,049**	**40,183**	**74.3%**

Note: Specific analysis sample sizes may vary from these for two reasons. First, data are missing for several variables for some clients. Second, some analyses of treatment exit data excluded clients admitted after July 1, 1997, due to the reduced rate of matched treatment exit records.

2. ANALYSIS METHODS

This report describes changes in client characteristics, treatment duration, and intermediate outcomes assessed at treatment exit among clients who entered Colorado's publicly

[5] Two major explanations exist for the sharp decline in treatment exit record response rates in 1997. First, many clients who entered treatment toward the end of the analysis period were still in treatment at the end of the analysis period (February 1999). Second, after the advent of managed care in July 1997, many of the treatment exit records provided by MSOs could not be matched with admission records. Response rates reportedly improved by the end of 1999.

BEST COPY AVAILABLE

funded treatment system for the first time between 1991 and 1999. In assessing trends during the 1990s, each client's admission date was used—either the admission year was treated as a categorical variable, or the admission month was converted to a continuous sequential variable starting with "0" (July 1991) and ending with "104" (February 1999). The effect of passing time was then analyzed using cross-tabulations or regression analysis.

- Cross-tabulations were used to compare the responses on multilevel categorical variables for all clients admitted within a particular year with clients admitted in other years. For such cross-tabulations, Chi-square tests of significance were calculated. Virtually all analyses demonstrated statistically significant results; however, this is expected, due to the large analysis sample sizes.

- Regression analyses were used to assess more precise impacts of the passage of time, particularly when controlling for several other factors. Continuous dependent variables (e.g., treatment duration) were analyzed using ordinary least-squares (OLS) regressions while dichotomous dependent variables (e.g., treatment completion) were analyzed using logistic regression. In such cases, the passage of time was represented by the number of days that had elapsed since July 1, 1991, to the admission date.

- Survival analysis was performed to determine reliable estimates of the proportion of clients expected to return to treatment. Cox proportional hazards survival analysis techniques were used to analyze changes in the likelihood that clients would return to treatment over time and the factors associated with this likelihood.

Definitions for the variables used in regression analyses are presented in Appendix B.

Trend results are presented for 1991 through 1998, though analyses often included data from the first two months of 1999. Colorado provided data on admissions between January 1 and February 28, 1999. While the substantial number of admissions provide statistically reliable results, we determined that data from the first two months of 1999 are insufficient for assessing annual trends. Results for 1999 appear in some tables for illustrative purposes only.

The remainder of this report presents the results of analyses of change in profiles of Colorado's baseline treatment client characteristics at admission, changes in treatment duration and completion rates, information about substance abuse at treatment exit, and the likelihood that clients returned to care.

III. RESULTS

III. RESULTS

This chapter presents the results of the analysis of baseline admissions in Colorado's publicly funded treatment system, as reported to the DACODS data system. Information in this chapter is organized and presented according to the research questions described in Chapter I. To reiterate, this chapter provides information that partially answers the following questions:

- What were the characteristics of clients entering care for the first time in Colorado's public system, as well as the first time anywhere (e.g., their "baseline" treatment experience)? How have these characteristics changed over time?

- What type of treatment experience did clients have for their baseline experience in Colorado, how long did it last, and what was their status at treatment exit? How have these patterns changed over time?

- How did Colorado clients' substance use patterns change by the end of treatment? What factors are associated with reduced or eliminated substance use? How have these patterns changed over time?

- What was the likelihood that clients in Colorado would return to treatment in Colorado after treatment exit? What factors are associated with readmission? How have these patterns changed over time?

Chapter II presented an overview of the methodological approach employed in creating the analysis data file and implementing the statistical analyses. As described in Chapter II, the results that follow are based on analyses of clients as they first enter Colorado's publicly funded treatment system. About 44 percent of these "baseline" clients had prior treatment experience and 56 percent reported having no prior treatment experience anywhere. **Clients with no prior treatment experience are called "first timers" for this report and clients with one or more prior treatment experiences are called "non-first timers" for this report.**

1. PROFILES OF BASELINE CLIENTS AT ADMISSION

This section presents information on prior treatment experience, highlighting several changes that have taken place across the 1990s. Changes occurred in the modalities clients entered, client demographics, client problems at admission, and client substance abuse patterns. Overall, between 1991 and 1998:

- More females, adolescents, and racial/ethnic minorities were admitted to treatment

- Client problem severity assessed at admission declined somewhat, partly as a result of changing demographics

- Alcohol continued to be the most often cited primary problem substance, but declined; marijuana, the second most cited primary problem, increased.

The following sections provide detailed information on these and other findings.

1.1 Demographics

In 1991, the typical baseline client entering Colorado's publicly funded treatment system was male (73 percent), white non-Hispanic (62 percent), and 29 years old (though 12 percent were less than 17 years old). By 1998, the average client had changed significantly, in terms of age, gender, and race/ethnicity. Therefore, information on three target groups (adolescents, women, and racial/ethnic minorities) is summarized below, followed by analyses of other client demographics such as high school completion and reliance upon public funding to pay for treatment. In short, baseline admissions in Colorado were increasingly younger, more likely to be female, and to be a racial/ethnic minority. Specific changes and differences between first timers and non-first timers are described below.

Adolescents Increased as Percent of Total Admissions

The proportion of admissions who were adolescents increased significantly over time in Therapeutic Community, Non-methadone Outpatient, and Intensive Residential treatment (Exhibit III-1). For example, adolescents as a percent of total admissions grew from 12 percent (442 youth) in 1991 to 23 percent (1643 youth) in 1998.

EXHIBIT III-1
ADOLESCENTS AS A PERCENT OF ADMISSIONS IN THREE MODALITIES, 1991-1998

Modality	First Timers		Non-First Timers	
	1991	1998	1991	1998
Therapeutic Community	16%	18%**	7%	41%**
Intensive Residential	2%	11%***	3%	7%***
Non-methadone Outpatient	24%	35%***	6%	15%***

Note: Though the data presented here only contrast 1991 and 1998, they are based on a complete analysis of 50,775 admissions with valid, non-missing data between 1991 and 1999. Approximately 6 percent of cases were missing data. Essentially no adolescents received Transitional Residential or Methadone treatment.
***p<.0001, **p<.01.

Because promoting treatment for adolescents has been a focus of many national and State initiatives over the past decade, this emerging trend is consistent with these efforts. An implication of increasing numbers of adolescents in treatment is that treatment providers need to interact more with parents, schools, and juvenile justice officials than had been the case in the past.

Females Increased as Percent of Total Admissions

The proportion of admissions who are female also increased during the 1990s. Overall, female admissions grew from 27 percent of total admissions in 1991 to 36 percent in 1998 (Exhibit III-2). First timers were more likely to be women than non-first timers in three of the five modalities.

The proportion of women increased significantly in Non-methadone Outpatient, Transitional Residential, Intensive Residential, and Therapeutic Communities. For example, between 1991 and 1998, the proportion of Non-methadone Outpatient admissions who were women grew from 31 to 38 percent among first timers and from 25 to 35 percent among non-first timers.

BEST COPY AVAILABLE

EXHIBIT III-2
FEMALES AS PERCENT OF ADMISSIONS BY MODALITY, 1991-1998

Modality	First Timers		Non-First Timers	
	1991	1998	1991	1998
Therapeutic Community	19%	40%***	14%	23%
Intensive Residential	26%	31%***	21%	35%***
Transitional Residential	11%	28%***	15%	26%***
Methadone	43%	40%	37%	42%
Non-methadone Outpatient	31%	38%***	25%	35%***

Note: Though the data presented here only contrast 1991 and 1998, they are based on a complete analysis of 50,979 admissions with valid, non-missing data between 1991 and 1999. Approximately 6 percent of cases were missing data for either gender or prior treatment experience.
***$p<.000$.

Racial/Ethnic Minorities Increased as Percent of Total Admissions

Overall, the proportion of Hispanics in treatment increased during the 1990s (Exhibit III-3).[6] This increase mostly reflects increases in Non-methadone Outpatient treatment settings that outpaced decreases in racial/ethnic minorities admissions in the other modalities. Between 1991 and 1998, across all modalities, the proportion of Hispanic admissions increased from 25 percent to 41 percent among first timers and from 18 percent to 30 percent among non-first timers. During the same period, the proportion of African American first timers declined from 14 to 11 percent, while the proportion of African American non-first timers increased 1 percent. Asian Americans, who comprised fewer than 1 percent of first timers and non-first timers admitted to treatment in Colorado, are included in the "other non-white" category.

[6] Data on race/ethnicity were derived from a single item that queried whether the client was: White (non-Hispanic), Black (non-Hispanic), Native American, Alaskan Native, Asian/Pacific Islander, Hispanic/Mexican, Hispanic/Puerto Rican, Hispanic/Cuban, Other Hispanic, or Other Non-Hispanic. For analytic purposes, all Hispanics were grouped together under a single label of Hispanic.

BEST COPY AVAILABLE

EXHIBIT III-3
RACE/ETHNICITY OF ADMISSIONS, 1991-1998

	First Timers		Non-First Timers	
	1991	**1998**	**1991**	**1998**
White, Non-Hispanic	58%	45%***	67%	55%***
Hispanic	25%	41%***	18%	30%***
African American	14%	11%***	11%	12%**
Other Non-White	3%	3%	4%	3%
Total	100%	100%	100%	100%

Note: Though the data presented here only contrast 1991 and 1998, they are based on a complete analysis of 51,138 admissions with valid, non-missing data between 1991 and 1999. Approximately 5 percent of cases were missing data.
***p<.0001, **p<.01.

Colorado's statewide racial/ethnic minority population is expected to increase by 23 percent between 1998 and 2005, far surpassing the growth rate in non-minority populations in Colorado (U.S. Department of Commerce, 1999). Continued comparisons are needed between treatment admissions and statewide population trends. Treatment system managers can monitor treatment admissions to assure that treatment remains accessible to all clients. Treatment providers can use information about emerging population trends to review and revise their treatment protocols.

1.2 Problems at Admission

Clients often have other problems in their lives that can contribute to or maintain their addiction. Treating people who have more problems requires more time and resources and a different mix of services than are required to treat people with comparatively fewer problems. This section summarizes data on client problems based on subjective client assessments by provider staff, and objective self-reports by clients.

Provider Staff Assessments of Clients

Colorado's DACODS system gathers data on whether clients have significant "substance abuse related problems" in any of six functional areas: physical, family, marital, social, work/school, and legal. Indicators are single dimensional yes/no variables and rely upon clinical judgement. Over the decade, 95 percent of clients admitted for treatment experienced significant

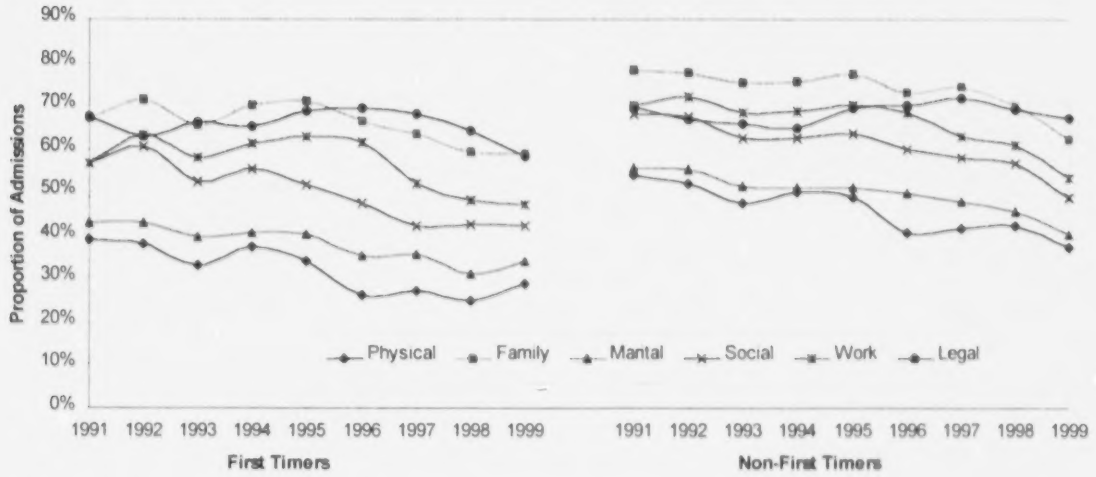
problems in at least one of the six functional areas. We analyzed the prevalence of specific, separate problems reported at admission. We also combined these problems into a single multidimensional index.

Prevalence of Specific Problems. More clients had family problems (71%) over the decade than any other single problem. Family problems were followed by legal problems (67%), work/school problems (63%), social problems (57%), marital problems (45%), and physical problems (40%). Non-first timers were more often assessed with problems compared to first timers.

- Family problems were identified among 75 percent of non-first timers and 67 percent of first timers.
- Legal problems were identified among 68 percent of non-first timers and 66 percent of first timers.
- Work or school problems were identified among 68 percent of non-first timers and 58 percent of first timers.
- Social problems were identified among 62 percent of non-first timers and 51 percent of first timers.
- Marital problems were identified among 51 percent of non-first timers and 39 percent of first timers.
- Physical problems were identified among 47 percent of non-first timers and 32 percent of first timers.

Prevalence of problems declined across the decade (Exhibit III-4). It is possible that changes in client demographics could contribute to this declining prevalence. Regression analyses confirmed the likelihood that clients identified with these problems varied with age. Nonetheless, significant decreases in prevalence occurred in five of the six areas (legal problems did not decline). Finally, while prevalence declined among first timers and non-first timers, the declines were not as steep among non-first timers.

EXHIBIT III-4
PREVALENCE OF FUNCTIONAL PROBLEMS AT ADMISSION, 1991-1999



Note: Analysis sample sizes averaged approximately 50,000 for each functional area. Data were missing or invalid for 6 percent of records for any given functional area; item response varied only slightly across variables and over years.

Index of problems. The proportion of clients with multiple problems generally declined over the 1990s (Exhibit III-5). Impairment in multiple areas can present challenges to achieving positive substance abuse treatment results with clients. If the proportion of clients with multiple problems declines, the concomitant challenges facing treatment providers may also decline. Between 1991 and 1998, the proportion of admissions with three or more problems:

- Decreased notably among Non-methadone Outpatient clients (70% to 52%) and less notably among Intensive Residential clients (80% to 75%)—together these account for 81 percent of all admissions
- Increased slightly among Therapeutic Community clients (95% to 97%) and notably among Transitional Residential clients (78% to 92%).

EXHIBIT III-5
PROPORTION OF CLIENTS IN COLORADO ASSESSED AS HAVING THREE OR MORE PROBLEMS AT ADMISSION, 1991-1998

Admission Year	Therapeutic Community	Intensive Residential	Transitional Residential	Methadone	Non-Methadone Outpatient
1991	95%	80%	78%	58%	70%
1992	97%	80%	85%	56%	72%
1993	93%	82%	82%	47%	64%
1994	93%	91%	81%	45%	67%
1995	96%	90%	87%	46%	68%
1996	97%	84%	91%	47%	62%
1997	96%	73%	91%	54%	56%
1998	97%	75%	92%	53%	52%

Note: Calculations are based on 52,758 clients. Overall, 76 percent of admission records had valid and non-missing data for each of the six functional categories (listwise)–which was a criterion to be used in this analysis. Admissions in 1999 were not included in this analysis due to low cell counts for Therapeutic Community admissions.

Problems Reported by Clients

DACODS also collects objective indicators of client status and problems in addition to summary assessments of functioning provided by staff. Differences across modalities and over time were generally unremarkable. Overall results are provided below:

- Of Colorado's baseline admissions, 50 percent never completed high school.
- Public assistance agencies provided financial support to 16 percent of all clients.
- Unemployment affected 59 percent of clients.
- Physical or mental disabilities affected about 9 percent of clients at admission, including 8 percent of first timers and 11 percent of non-first timers.
- Homelessness was reported by 5 percent of first timers and 10 percent of non-first timers.

Prior arrests were reported by about 63 percent of Colorado's clients overall, including 61 percent of first timers and 66 percent of non-first timers.

The proportion of all clients entering treatment who reported they had initiated drug or alcohol use by age 15 declined during the 1990s. Initiation by age 15 is regarded by experts as highly predictive of more difficulties later in life. More than half of all of Colorado's baseline admissions had used drugs or alcohol by age 15. Between 1991 and 1998, the proportion of first timers reporting use by age 15 declined from 58 to 53 percent. During the same period, the proportion of non-first timers reporting use by age 15 also declined from 62 to 52 percent.

This analysis combined clinician-assessed and client-reported measures of problems. Clinician-assessed variables include legal, marital, social, work, health and family problems; client-reported variables include prior arrests, homelessness, employment problems, and self-reported disability. Overall, clients who entered treatment more recently had fewer problems than clients who entered earlier. Non-methadone Outpatient clients who entered treatment more recently had fewer problems than those who entered earlier in the decade. Moreover, clients who had prior treatment experience were more likely to have problems than first timers.

1.3 Substances Used

This section examines changes in which drugs or alcohol are reported by clients as problems at admission. Analyses that follow also explore the relationship between demographics, functional problems, and clients' reported drug and alcohol problems. The majority of clients entering treatment in Colorado reported having problems with more than one substance at admission. Colorado asks clients to report their primary, secondary, and tertiary problem substances (drugs or alcohol), and clients who report problems with more than one substance are considered to be "poly-substance users" in this report.

Primary Problem Substances

For most of the 1990s, alcohol was the primary problem substance for which clients sought treatment in Colorado. Alcohol abuse declined over the decade, however, while marijuana use increased as the primary problem substance reported by clients at admission. (Exhibit III-6). Between 1991 and 1998:

- Alcohol declined as the primary problem substance, from 62 to 38 percent among all baseline admissions, 64 to 36 percent of first timers and 59 to 40 percent among non-first timers.

- Marijuana increased as the primary problem substance, from 10 to 25 percent of all baseline admissions, 11 to 31 percent among first timers and 9 to 19 percent among non-first timers.

- Methamphetamine increased as a primary problem substance, from 3 to 10 percent of all baseline admissions as well as among first timers and non-first timers.

- Heroin remained largely unchanged as a primary substance, reported by 9 percent of all baseline admissions, including 6 percent among first timers and 12 percent among non-first timers.

- Cocaine (including crack) also remained largely unchanged as a primary substance, reported by 14 percent of all admissions, including 14 percent of first timers and 16 percent of non-first timers.

The rate of decline in alcohol and the rate of increase in marijuana as the primary problem substance were more pronounced among first timers than non-first timers. For example, between 1991 and 1998, the proportion of first timers citing problems with alcohol declined 28 percent while the proportion of non-first timers citing alcohol declined 19 percent.

EXHIBIT III-6
PRIMARY PROBLEM SUBSTANCE AT ADMISSION, 1991-1998

	First Timers		Non-First Timers	
	1991	1998	1991	1998
Alcohol	64%	36%***	59%	40%***
Marijuana/Hashish	11%	31%***	9%	19%***
Methamphetamine/Uppers	3%	10%***	3%	10%***
Heroin	6%	6%	12%	12%
Cocaine/Crack	14%	14%***	13%	16%**
Other	2%	3%**	4%	3%*
Total	100%	100%	100%	100%

Note: Though the data presented here only contrast 1991 and 1998, they are based on a complete analysis of 50,885 admissions with valid, non-missing data between 1991 and 1999. Data on primary problem substance were missing or invalid for about 6 percent of records. Statistically significant differences in cocaine/crack among first timers resulted from shifts over the 7-year period of a few percent per year rather than a uniform increase or decrease.

***p<.0001 **p<.001 * p<.01

BEST COPY AVAILABLE

Poly-substance Abuse

Poly-substance abuse is a problem in Colorado, as elsewhere in the nation. Considering all baseline admissions between 1991 and 1999, 57 percent of clients reported having two or more problem substances while 43 percent reported only one problem substance. First timers reported having two or more problem substances less often than non-first timers:

- Two or more problem substances were reported by 55 percent of first timers and 61 percent of non-first timers.
- Three or more problem substances were reported by 26 percent of first timers and 33 percent of non-first timers.

Alcohol and marijuana/hashish were the most commonly cited secondary and tertiary problem substances. Alcohol was reported by 25 percent of all baseline admissions and marijuana was reported by 24 percent as either a secondary or tertiary problem. Cocaine and crack were the next most often cited substances, reported by 16 percent of all baseline admissions as either a secondary or tertiary problem. Clients who reported having a primary problem with alcohol or marijuana were less likely to have a tertiary problem substance. Conversely, clients with a primary problem of cocaine/crack, heroin, or other substances were more likely to have a tertiary problem. Differences between first timers and non-first timers in secondary and tertiary problems were negligible.

The proportion of first timers and non-first timers reporting problems with two or more problem substances at admission increased during the decade. Comparing baseline admissions between 1991 and 1998:

- The proportion of first timers reporting problems with two or more substances increased from 47 to 68 percent.
- The proportion of non-first timers reporting a problems with two or more substances increased from 56 to 68 percent.

Similar increases in the proportion of clients reporting three or more problems were found during the decade.

Frequency of Use

Frequency of substance use among clients entering treatment ranged from daily use to no use in the 30 days preceding admission:

- 26 percent of admissions reported daily use of drugs and/or alcohol
- 25 percent of admissions reported using drugs or drinking one to six times per week
- 19 percent reported using drugs or drinking one to three times per month.

Another 30 percent of baseline admissions reported no use of their primary problem substance in the 30 days before entering treatment.

Compared with first timers, non-first timers were more likely to report either no use or daily use of alcohol and drugs in the 30 days before admission (Exhibit III-7). More non-first timers than first timers reported *no* use in the 30 days before admission (31% compared to 25%). Similarly, more non-first timers than first timers reported *daily* use in the 30 days before admission (33% compared to 24%). Among the potential explanations of these findings are that non-first timers who reported zero past month use may be clients who enter treatment for continuing care; non-first timers who reported daily use may be clients who have relapsed to full use and have generally more chronic problems.

EXHIBIT III-7
MAXIMUM FREQUENCY OF USE OF PRIMARY PROBLEM SUBSTANCE IN 30 DAYS BEFORE ADMISSION

Use in 30 Days Before Admission	First Timers	Non-First Timers
Zero Past Month Use	25%	31%
Less Than Daily Use	51%	36%
Daily Past Month Use	24%	33%
Total	100%	100%

Note: Data are based on 51,056 clients with valid and non-missing admission data on drug use. Approximately 6 percent of cases were missing data.

Frequency of use at admission changed only slightly during the decade. From 1991 to 1998, the proportion of first timers who cited zero use in the 30 days prior to admission increased from 24 to 32 percent while the proportion of non-first timers reporting zero use increased

BEST COPY AVAILABLE

slightly, from 32 to 35 percent. The proportion of clients who cited daily use remained at about 29 percent of admissions.

1.4 Relationships Among Trends in Demographics, Problem Substances, and Functional Problems

Changes in demographics or other factors may partially account for observed trends in substance abuse patterns at admission. There may have been changes in both the substance use patterns and the associated demographics of clients who entered treatment in Colorado. Logistic regression analyses were used to control for demographic and other changes that could occur simultaneously with change in substance use patterns over time. A detailed description of the factors studied in the logistic regression is included in Appendix B. Briefly, the logistic regressions analyzed the following factors:

- Elapsed time from July 1991 to the client's admission date (time "index")
- Client demographics (age, female, African American, Hispanic)
- Staff assessed problems at admission, 0-6 possible problems
- Client reported problems including homeless, disabled, prior arrest
- Client full-time employment
- Maximum frequency of substance use in the 30 days prior to admission
- Treatment modality (compared to Non-methadone Outpatient)
- Number of prior detoxifications (based on client report at admission).

Stepwise logistic regressions were estimated for both first timers and non-first timers for each problem drug category (alcohol, marijuana/hashish, cocaine/crack, heroin, and methamphetamine).

Our primary question in this analysis was whether, all other factors being held equal, the trends in drug use noted from "raw" data still held. The logistic regressions concluded that clients who entered treatment relatively later in the decade, compared to earlier, were less likely to report alcohol as a primary problem and more likely to report either marijuana or methamphetamines/uppers. Moreover, non-first timers were more likely to report cocaine/crack

or heroin. Other specific findings for the most prevalent types of substance are summarized below. A tabular summary of these findings is provided in Exhibit III-8, indicating differences between first timers and non-first timers only where present. Detailed logistic regression summary tables are presented in Appendix B.

EXHIBIT III-8
CHARACTERISTICS ASSOCIATED WITH ADMISSION PRIMARY SUBSTANCE PROBLEM AMONG BASELINE ADMISSIONS TO TREATMENT

Predictor Variable	Alcohol FT/NFT	Marijuana/ Hashish FT/NFT	Cocaine/ Crack FT/NFT	Heroin FT/NFT	Methamphetamine/ Uppers FT/NFT
Number of Months Elapsed Between 7/91 and Admit Month	▼/▼	▲/▲	--/▲	--/▲	▲/▲
Adult	▲/▲	▼/▼	▲/▲	▲/▲	▲/▲
Female	--/▲	▼/▼	▲/▲	--/--	▲/▲
African American	▼/▼	▲/▼	▲/▲	--/--	▼/▼
Native American	▲/▲	--/▼	▼/▼	--/--	▼/▼
Hispanic	▲/▲	--/▼	▲/▲	▲/▲	▼/▼
Other Race/Ethnicity	--/--	▲/--	▲/▲	--/▲	▼/▼
Homeless	▲/▲	▼/▼	--/--	--/--	--/--
Disabled (Client Reported)	▲/▲	▼/--	▼/▼	▼/▼	--/--
Employed Full-time	▲/▲	▼/▼	▲/--	--/▼	▼/▼
Ever Arrested	▲/▲	--/--	▼/▼	--/▼	▲/--
Staff Assessed Problems at Admission (0-6 Problems Possible)	▼/▼	--/▼	▲/▲	--/--	▲/▲
Modality (vs. Non-methadone Outpatient)					
Therapeutic community	▼/▼	▼/▼	▲/▲	▲/▲	▲/▲
Intensive residential	▼/▼	▼/▼	▲/▲	▲/▲	▲/▲
Transitional residential	▼/--	▼/▼	▲/▲	▲/--	--/▼
Methadone	n/a	n/a	n/a	▲/▲	n/a
Number of Prior Detoxifications	▲/▲	▼/▼	▼/▼	--/--	▼/▼

Note: Data are based on 25,073 admission records with valid and non-missing data. "FT/NFT" refers to first timers/ non-first timers. A "--" means there was no statistically significant relationship. The first arrow represents whether the factor increased (▲) or decreased (▼) odds among first timers and the second arrow depicts increased/decreased odds among non-first timers. Only relationships significant at the .05 level are presented; virtually all relationships were significant at the .001 level.

Alcohol. Alcohol users were more likely to be adult males. They were more likely to be Hispanic or Native American than white, and more likely to be white than African American. Homeless and disabled clients, as well as clients with full-time jobs and fewer problems overall,

were all more likely to report alcohol as a primary problem. Non-methadone Outpatient treatment providers were more likely to treat alcohol abusers than other modalities, all other factors aside. Prior detoxification experience increased the odds that the primary problem is alcohol.

Marijuana/Hashish. Non-adult white males were most likely to report marijuana/hashish as their primary problem substance. Homeless or disabled clients were less likely to report marijuana/hashish. Clients who were assessed by staff to have more problems at admission also had lower odds of reporting marijuana/hashish as their primary problem. Non-methadone Outpatient treatment providers were more likely than the other modalities to see clients with a primary marijuana/hashish problem. Clients who had prior detoxification were less likely to report marijuana/hashish.

Cocaine/Crack. Cocaine and crack users in Colorado tended to be adult African American or Hispanic women. Disabled clients were less likely to report cocaine/crack. Clients with more problems assessed at admission had higher odds of reporting cocaine/crack. Clients treated in Therapeutic Community, Intensive Residential, or Transitional Residential settings were more likely to report cocaine/crack than clients in Methadone or Non-methadone Outpatient treatment. Prior detoxification experience decreased the odds that cocaine/crack was the primary problem.

Heroin. Heroin users tended to be adult Hispanics. Gender and racial categories were not strong predictors of reporting heroin as a primary problem. As expected, the odds that clients in Methadone treatment reported heroin as their primary problem were vastly higher than clients treated in other settings, though Therapeutic Community, Intensive Residential, and Transitional Residential clients were also more likely to report heroin than clients in Non-methadone Outpatient settings.

Methamphetamine/Stimulants. Methamphetamine and stimulant users tended to be adult white females, not employed, and to have had more problems assessed at admission.

In sum, the profile of baseline admissions to Colorado's publicly funded treatment system changed during the 1990s. There were more adolescents, females, and racial/ethnic minorities in treatment by the end of the decade compared with earlier in the decade. During this period, the number of problems assessed by staff and reported by clients declined in general. Poly-substance use continued to be reported by the majority of clients. The proportion of clients reporting alcohol as their primary problem decreased remarkably while the proportion of clients

reporting marijuana/hashish increased, particularly among first timers entering treatment. The next section explores the relationships between these trends in admission profiles and clients' treatment duration and likelihood of completion.

2. TREATMENT EXPERIENCES

Analysis of DACODS data provides insight into the utilization patterns and treatment completion rates for clients served in Colorado's publicly funded treatment system. Reduced drug use and treatment reentry are addressed in the next two sections. Trends in the characteristics of baseline clients entering treatment that were documented in the previous section may influence treatment duration and completion rates. Accordingly, this section also builds on the previous section by exploring the relationship between underlying client characteristics and trends in treatment duration and completion in Colorado. In general, results presented in this section show that:

- Treatment duration declined from 1991 to 1997 in Therapeutic Communities, Methadone, and Non-methadone Outpatient treatment and remained unchanged in the other modalities.

- Treatment completion rates held steady at about 43 percent overall, but varied considerably within modalities from year to year.

Detailed analyses of treatment duration and completion are provided in the following sections.

2.1 Treatment Settings for Baseline Treatment Admissions

Overall, two-thirds of admissions to treatment in Colorado's publicly funded treatment providers went to Non-methadone Outpatient treatment. The balance of clients started off in Intensive Residential treatment (15%), Methadone treatment (8%), Transitional Residential providers (7%) and Therapeutic Communities (3%).[7]

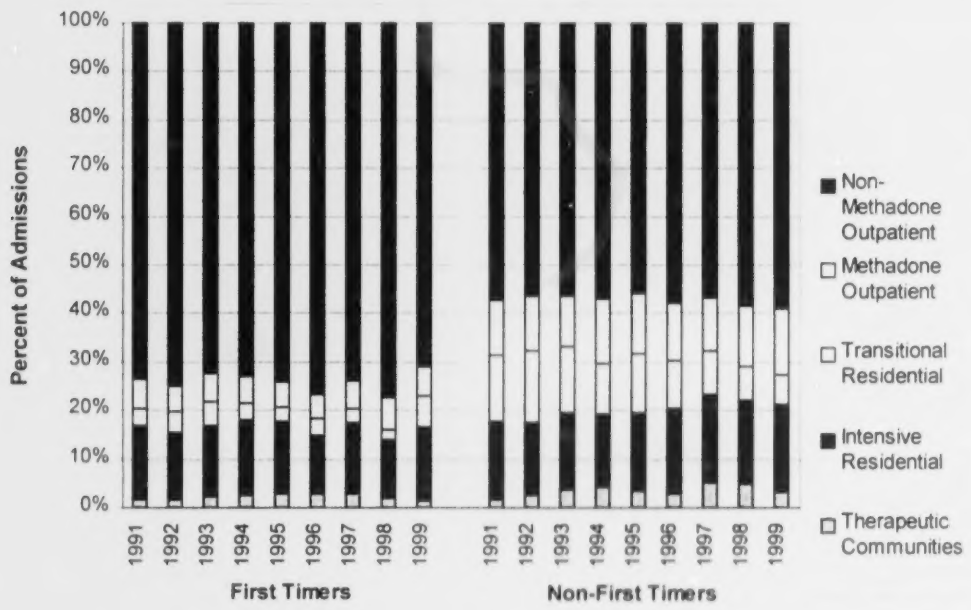
First timers were significantly more likely to start in Non-methadone Outpatient than non-first timers (75% versus 57%). First timers were much less likely than non-first timers to start off in Methadone treatment providers (6% versus 12%) or Transitional Residential (4%

[7] To reiterate, data on non-first timers' admission to treatment reflect their first encounter in Colorado's publicly funded treatment system between January 1989 and February 1999. Non-first timers were probably seen in private sector treatment in Colorado or publicly funded treatment in another State.

versus 12%). First timers were only slightly less likely than their counterparts to start in Intensive Residential (14% versus 16%) or Therapeutic Communities (2% versus 4%).

There were slight increases in the proportion of admissions entering Non-methadone Outpatient treatment, and a decrease in residential treatment admissions. The proportion of first timers entering Non-methadone Outpatient treatment increased from 74 percent in 1991 to 77 percent in 1998 (Exhibit III-9). The proportion of first timers who started off in residential treatment (intensive or transitional) dropped from 19 percent in 1991 to 14 percent by 1998. The proportion of non-first timers entering residential treatment also declined from 30 percent to 24 percent. Most of the decline in residential treatment occurred in Transitional Residential settings, which logged nearly 50 percent fewer admissions in 1998 compared to 1991. It is unclear whether these changes reflect shifts in funding, policies, or client preferences.

EXHIBIT III-9
PERCENT OF FIRST TIME ADMISSIONS BY MODALITY OF CARE, 1991-1999



Note: Data are based on 51,142 admission records. An additional 2,907 records were missing data about prior treatment experience. Data reported for 1999 are for the first two months only.

2.2 Treatment Duration

Longer treatment duration has been associated with better outcomes in several studies (e.g., Simpson et al., 1997). This section describes statistical properties of duration as a continuous variable and assesses change in duration over time.

We calculated treatment duration by subtracting treatment exit date from admission date. The treatment exit date in Colorado's DACODS is intended to be the last date on which services were provided. This calculation is relatively straightforward for residential treatment, but may be somewhat less clear for outpatient treatment. For example, some outpatient clients may miss several counseling appointments and it may take the provider several weeks—and often a series of attempts to reach the client—before the treatment exit forms are issued. It is, therefore, possible the difference between a treatment exit date and admission date overstates the actual length of stay for outpatient programs.[8]

The duration of treatment for baseline admissions in Colorado was shortest in Intensive Residential and Transitional Residential treatment, and longer in Non-methadone Outpatient, Therapeutic Community, and Methadone treatment. The following discussion is divided into a presentation of the distribution patterns of treatment duration across clients by modality and an analysis of change in treatment duration, including a summary of the average duration of treatment.

Descriptive Data on Treatment Duration

The cumulative distribution of length of stay for first timers and non-first timers is presented in Exhibit III-10. To read this exhibit, the 50th percentile is the median, where half the clients had longer stays and half the clients had shorter stays. Also shown are the values for which 25 percent, 75 percent, and 99 percent of clients had shorter durations. For example, among first timers, half of the Non-methadone Outpatient clients stayed less than 108 days and half stayed longer than 108 days. In this analysis, median treatment duration was less than

[8] Treatment duration had to be adjusted for some clients who appeared to have simultaneous treatment episodes. Of those clients who have a second admission record on file with DACODS during the analysis period, about 5 percent had a second admission date that came before the treatment exit date of their first treatment. For the outpatient modalities, the treatment exit date from the first provider was reset to equal the admission date to the second. For residential treatment, these cases were dropped because some clients legitimately enrolled in outpatient treatment while also in residential treatment (personal communication, Bruce Mendelson, 1999).

average treatment duration simply because some clients have very long treatment episodes, which mathematically increases the apparent average treatment duration.

Median treatment duration was shorter for first timers compared to non-first timers in three of the five modalities. For example:

- First timers had shorter stays than non-first timers in Non-methadone Outpatient treatment (108 days compared to 123 days), and Intensive Residential treatment (21 compared to 23 days).
- First timers had longer stays than non-first timers in Therapeutic Communities (71 days compared to 66 days).
- First timers stayed as long as non-first timers in Transitional Residential treatment.

About 10 percent of treatment clients remained in treatment longer than a year (not shown). Over the decade, 5 percent of Methadone clients stayed at least 22 months; 5 percent of Non-methadone Outpatient clients stayed longer than 15 months and 5 percent of Therapeutic Community clients stayed longer than 11 months (Exhibit III-10). Indeed, some Methadone clients who entered treatment in 1989 or 1990 were still in treatment at the end of the analysis period.

EXHIBIT III-10
PERCENTILE DISTRIBUTION OF TREATMENT DURATION BY MODALITY, ALL YEARS

	PERCENTILE			
	25% of Clients Stayed Fewer Days Than:	Median 50% of Clients Stayed Fewer Days Than:	75% of Clients Stayed Fewer Days Than:	99% of Clients Stayed Fewer Days Than:
First Timers				
Therapeutic Communities	22	71	247	720
Intensive Residential	16	21	43	527
Transitional Residential	13	39	64	818
Methadone Outpatient**	31	74	183	2234
Non-methadone Outpatient	50	108	209	2309
Non-First Timers				
Therapeutic Communities	17	66	243	620
Intensive Residential	18	23	43	417
Transitional Residential	16	41	75	1129
Methadone Outpatient**	42	97	260	1951
Non-methadone Outpatient	61	123	231	2589

Note: Data are based upon analysis of 35,489 records with valid and non-missing treatment exit dates.

** Methadone treatment duration may be lower than is actually the case: some long-term clients may not be reflected in this sample, including clients admitted prior to 1989 and clients who were admitted later in the 1990s and remained in treatment at the end of the analysis period.

Trends in Treatment Duration During the 1990s

During the 1990s, average treatment duration declined significantly among Non-methadone Outpatient and Therapeutic Community clients, but increased slightly among Intensive Residential and Transitional Residential clients. Comparing admissions to treatment between 1991 and 1997 (Exhibit III-11):

- Non-methadone Outpatient duration declined among first timers (156 to 107 days) and non-first timers (168 to 123 days).

- Therapeutic Community duration declined among first timers over the decade, though the values are not displayed for 1991 due to small cell size.
- Intensive Residential duration increased among first timers (29 to 44 days) but did not change significantly among non-first timers (27 to 29 days).
- Transitional Residential duration increased among first timers (45 to 50 days) but not among non-first timers (51 days).

EXHIBIT III-11
AVERAGE TREATMENT DURATION (DAYS), 1991-1997

Modality	First Timers		Non-First Timers	
	1991	1997	1991	1997
Therapeutic Community	--	95	--	130
Intensive Residential	29	44***	27	29
Transitional Residential	45	50***	51	51
Non-methadone Outpatient	156	107***	168	123***

Note: Though the data presented here only contrast 1991 and 1997, they are based on a complete analysis of 35,489 admission and discharge records with valid, non-missing dates. Cells with fewer than 50 cases were suppressed, and a dash "--" means the cell size was too small for analysis.
*** $p \leq .0001$.

Methadone duration is not shown because many clients admitted later in the decade are still in treatment, such that average treatment duration based upon clients admitted *and discharged* later in the decade would appear to be smaller than is actually the case. This would bias comparisons toward showing a more significant effect.

Treatment duration is influenced by treatment provider philosophy, client characteristics and needs, the influence of environmental factors such as payer requirements, and many other factors. Changes in treatment duration may be influenced by a variety of these underlying factors. DACODS offers the opportunity to explore the relationship between client factors and treatment duration. No known single database allows a full examination of these issues.

Regression models were used to estimate the degree and magnitude of impact of the passage of time on treatment duration. Two regressions were estimated for both first timers and non-first timers, and for each treatment modality. First, "unadjusted" bivariate models were tested where treatment duration was simply regressed on the number of months elapsed between July 1991 and the client's admission month. Second, "adjusted" models were used to estimate

the effect of passing time, while controlling for the influence of several client factors, including gender, race/ethnicity, adult/adolescents, scaled problems (0-6 problems assessed by treatment staff at admission), and primary problem substance.

Results of the regressions confirm that treatment duration declined in Therapeutic Community, and Non-methadone Outpatient treatment clients but increased somewhat in Intensive Residential and Transitional Residential treatment clients (Exhibit III-12). Coefficients for the passage of time remained largely unaffected by the addition of client variables. For example, among Non-methadone Outpatient first timers, duration declined by .83 days per month whether client factors were considered or not. The two exceptions to these findings are found among Therapeutic Community first timers and Intensive Residential first timers:

- Among Therapeutic Community first timers, controlling for client factors resulted in a slower decline in treatment duration (a decrease of .93 days per month compared to 1.37 days estimated without controlling for client factors).

- On the other hand, among Intensive Residential first timers, treatment duration increased slightly over the decade, and controlling for client factors magnified this increase (an increase of 0.10 days per month compared to 0.01 days estimated without controlling for client factors.

These models are weak predictors of treatment duration, but still lend credence to trends described in this report. The proportion of variance explained by these models is extremely low (less than 4% for each model), mostly because many other intervening factors account for variation in treatment duration. Among the other factors that contribute to variation in treatment duration are specific treatment provider philosophies, availability of other services to support clients, client social supports and networks, other services, and other factors for which data were unavailable and hence could not be used in these models.

The length of time it took to *complete* treatment, rather than just exit from treatment, also declined with time. For example, Non-methadone Outpatient and Therapeutic Community clients alike completed their treatment in four months less time in 1997 compared with 1991. Treatment system managers and funding bodies will need to explore this finding more carefully to determine what other factors are associated with the more rapid completions. Even if client characteristics (e.g., age or declining severity) explain this trend, it has implications for future resource planning in the public treatment system.

EXHIBIT III-12
CHANGE IN TREATMENT DURATION (IN DAYS) WITH PASSAGE OF EACH MONTH SINCE JULY 1991

Treatment Modality	First Timers		Non-First Timers	
	Time Alone	Time + Client Factors	Time Alone	Time + Client Factors
Therapeutic Community	-1.37 days	-0.93 days	ns	ns
Intensive Residential	+0.01 days	+0.10 days	ns	ns
Transitional Residential	+0.22 days	+0.25 days	ns	ns
Non-methadone Outpatient	-0.83 days	-0.83 days	-0.73 days	-0.69 days

Note: Data are regression coefficients for the elapsed time from July 1991 to the client's admission date, based on standard OLS regressions. The "ns" means the coefficient was not significant at the .05 level.

2.3 Completion Rates

The DACODS database records the status of clients who exit from treatment. DACODS reports whether clients successfully completed all their treatment, completed more than half, completed less than half, were arrested, or died. Completion rates need to be monitored for change over time. Many stakeholders consider successful treatment completion to be a useful proxy when post-treatment follow-up data are not available. Completion rates do not, however, fully reflect "success" in treatment because drug or alcohol use or other problems may re-emerge after clients leave treatment. The validity and utility of treatment completion as a proxy for other outcomes need to be assessed through other analytic efforts. Actual post-treatment follow-up data are preferred.

Among Colorado's baseline admissions to treatment, 42 percent of clients who exited from treatment during the 1990s successfully completed treatment. Another 17 percent completed more than half their treatment and 34 percent completed less than half prior to exiting. Approximately 1 to 3 percent of clients each year were arrested. Unfortunately, several hundred clients (less than 1%) also died during the decade while they were still in treatment.

Overall, the proportion of clients who successfully completed treatment declined somewhat from 1991 to 1998. The proportion of Non-methadone Outpatient clients who successfully completed treatment declined from 50 to 38 percent among first timers and from 37 to 27 percent among non-first timers. The proportion of Intensive Residential first timers and Transitional Residential non-first timers who successfully completed treatment also declined.

Rates of success for Methadone treatment are shown but should be interpreted with caution as many clients are maintained on methadone indefinitely, sometimes for the rest of their lives. As these data do not include clients who remained in treatment at the end of the analysis period, it is expected that more clients who departed from treatment did so without having successfully "completed" treatment.

Prior treatment exposure helped predict who would complete treatment successfully (Exhibit III-13). More first timers in Non-methadone Outpatient treatment completed treatment than non-first timers: averaging across all clients admitted between 1991 and 1997, 44 percent of first timers completed treatment compared with 34 percent of non-first timers. On the other hand, first timers were as likely or slightly less likely to complete treatment as non-first timers in the other modalities.

EXHIBIT III-13
TREATMENT COMPLETION RATES BY MODALITY, 1991-1998

Admission	Therapeutic Community	Intensive Residential	Transitional Residential	Methadone	Non-Methadone Outpatient
First Timers					
1991	--	75%	40%	22%	50%
1992	29%	70%	39%	18%	42%
1993	15%	63%	49%	10%	46%
1994	35%	69%	29%	5%	41%
1995	39%	70%	35%	9%	42%
1996	28%	59%	39%	8%	43%
1997	25%	64%	38%	13%	47%
1998	29%	59%	--	--	38%
Non-First Timers					
1991	--	76%	42%	21%	37%
1992	29%	75%	43%	20%	35%
1993	22%	72%	41%	11%	33%
1994	33%	69%	36%	6%	33%
1995	44%	71%	34%	3%	34%
1996	21%	64%	33%	9%	34%
1997	35%	59%	26%	5%	38%
1998	33%	75%	--	--	27%

Note: Data based on 35,489 treatment exit records with valid, non-missing data on treatment completion. Percentages exclude a DACODS treatment exit category called "screening and evaluation only" as well as the <1% percent of admissions who died while still in treatment. A "--" means that the cell size was too small to generate a reliable estimate.

3. DRUG AND ALCOHOL USE AT TREATMENT EXIT

Reduction and, preferably, the elimination of alcohol and drug abuse is the primary goal underlying substance abuse treatment. Many factors influenced whether clients reduced or eliminated drug or alcohol use by treatment exit. In addition to the treatment interventions, these factors included client characteristics and social support, treatment philosophy and approaches to treatment, and other environmental characteristics. Significant changes in client characteristics and treatment duration that occurred in Colorado may have influenced the odds that clients reduce or eliminate drug and alcohol use. The use of drugs and alcohol at treatment exit are analyzed in this section in light of these factors.

Data on drug and alcohol use frequency were drawn from treatment exit records and compared with similar data from clients' admission records. Admission and exit records both obtain information on the frequency of use of the primary, secondary, and tertiary variable:

- No use
- One to three times per month
- One to two times per week
- Three to six times per week
- Daily.

DACODS includes no single, composite frequency of substance use variable. The maximum reported frequency for either the client's primary, secondary, or tertiary substance was selected to represent frequency of use.

Drug and alcohol outcome data are presented in this section in two ways: percent of clients who had no drug or alcohol use at treatment exit, and change in frequency of drug or alcohol use from admission to treatment exit. A client was considered to have *reduced* their drug and alcohol use if they, in fact, reduced the frequency of use of their primary problem drug, or had no use of it in the 30 days prior to admission and again at treatment exit. Clients are defined as not having reduced use if there is no change or there is an increase in frequency of drug or alcohol use between admission and treatment exit. In general, results presented in this section show that:

- Over the decade, two-thirds of baseline clients did not use drugs or alcohol at treatment exit and and three-quarters of clients reduced the frequency of their use.

- First timers admitted later in the decade were as likely to reduce or eliminate drug use compared to first timers admitted earlier.

- Non-first timers admitted later in the decade were slightly, but significantly, less likely to have reduced or eliminated substance use at treatment exit compared with clients admitted earlier in the decade.

- Treatment duration and completion are strong predictors of reduced and eliminated drug use at treatment exit.

Some client treatment exit data may be more reliable than other data. When clients successfully complete treatment, treatment staff have the ability to fully assess drug and alcohol use. When clients drop out of treatment, however, staff must rely on other information. This other information includes clinical notes, in-treatment client assessments, and urinalysis data. Some provider staff communicate with a client's family and friends and stay abreast of the client's drug and alcohol usage. Other provider staff rely upon their own clinical judgement when completing treatment exit form items about drug and alcohol use for clients who never come back. This variation alone makes treatment exit data within Colorado or any State less precise.

3.1 Drug And Alcohol Use Outcomes at Treatment Exit

A course of treatment was associated with eliminated substance use in 66 percent of clients and reduced use in an additional 8 percent of clients. Moreover, non-first timers were significantly more likely to reduce or eliminate their use than first timers. Among Colorado's baseline admissions to treatment, 66 percent of clients had no drug and alcohol use during the 30 days leading up to treatment exit. Among first timers, 63 percent had no use at treatment exit; among non-first timers, 70 percent had no use at treatment exit (Exhibit III-14).

Over the decade, three out of four clients (baseline admissions) reduced drug and alcohol use by the time they left treatment. About 73 percent of baseline clients reduced use of their primary substance, and 74 percent reduced use of any substance. Among first timers, 70 percent reduced use of their primary substance and 71 percent reduced use of any substance. Among non-first timers, 77 percent reduced use of their primary substance and 79 percent reduced use of any substance.

The proportion of clients who used drugs or alcohol daily dropped from 28 percent at admission to 10 percent at treatment exit. The proportion of first timers who used daily dropped from 24 percent at admission to 9 percent at treatment exit. The proportion of non-first timers who used daily dropped from 33 percent at admission to 11 percent at treatment exit.

EXHIBIT III-14
OVERVIEW OF DRUG/ALCOHOL OUTCOMES AT TREATMENT EXIT

	Overall	First Timers	Non-First Timers*
No Use at Treatment Exit (n=36,599)	66%	63%	70%
Reduced Use: Primary Substance (n=35,374)	73%	70%	77%
Reduced Use: Any Substance (n=35,570)	74%	71%	79%

Note: "Reduced" use includes clients who both entered and exited treatment with zero use in the preceding 30 days. "Daily use at admission and exit" present the percent of total clients who used drugs or alcohol daily at admission and the percent of total clients who used drugs or alcohol daily at discharge. All differences between first timers and non-first timers are significant at $p<.0001$.

The proportion of clients who used drugs or alcohol daily declined from 28 percent at admission to 10 percent when they left treatment. Among first timers, the proportion declined from 24 percent to 9 percent. Among non-first timers, the proportion declined from 33 to 11 percent.

3.2 Factors Associated with Drug and Alcohol Outcomes

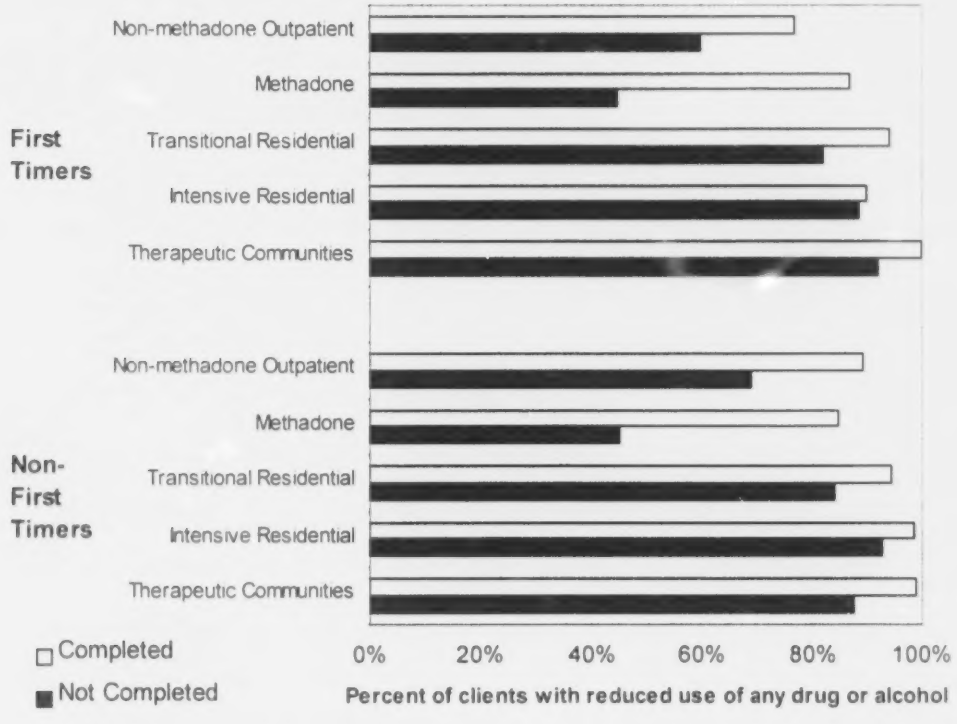
Many factors influence whether or not clients will reduce or eliminate their use of drugs and alcohol. This report is primarily focused on determining whether drug and alcohol outcomes, even these intermediate outcomes assessed at treatment exit, changed over time. Logistic regression analyses help separate the influence of other factors from secular trends observed over time. Before presenting the full analysis of factors associated with drug and alcohol outcomes, we present simple bivariate analyses of both treatment completion and prior treatment experience.

As expected, we found in DACODS that treatment completers were far more likely to have reduced or eliminated use compared with other clients (Exhibit III-15). Many treatment providers require that clients be "substance free" before they are successfully discharged from treatment. Analyses comparing completion status with substance use at discharge show the following:

- Among treatment completers, 86 percent reduced drug and alcohol by treatment exit and 83 percent had no drug and alcohol use at treatment exit. Among non-completers, only 68 percent reduced drug and alcohol and 56 percent had no drug and alcohol when they left treatment.

- At least 80 percent of treatment completers within a modality reduced drug and alcohol use by the time they left treatment compared to admission. Therapeutic Community graduates did the best overall, with 99 percent having reduced drug and alcohol use compared to 90 percent of non-completers.

EXHIBIT III-15
PROPORTION OF TREATMENT COMPLETERS AND NON-COMPLETERS WITH REDUCED DRUG AND ALCOHOL AT TREATMENT EXIT, BY MODALITY



Note: Data are based on 32,993 records with valid and non-missing data on completion and substance use frequency at admission and discharge. With the exception of Intensive Residential first timers, all differences are significant at $p<.001$.

Several potential factors contribute to treatment completion and, in turn, to positive drug and alcohol outcomes. Therefore, we sought to account simultaneously for as many factors as possible using logistic regression to differentiate the influence of specific factors. The tradeoff of

analyzing many variables simultaneously is that missing data reduces the number of cases upon which conclusions are generated. The following analyses are based on 55 percent of total clients (about 29,600 clients) with valid treatment exit data and complete admission data.

Binary stepwise logistic regression models were used to determine which factors differentiate those clients who reduced use frequently from those who did not, and to differentiate those who discontinued use from those who did not. A detailed description of the factors studied in the logistic regression are included in Appendix B. Briefly, the logistic regressions analyzed the following factors:

- Elapsed time from July 1991 to the client's admission date (time "index")
- Treatment duration (continuous variable, in days)
- Successful treatment completion (dichotomous variable)
- Client demographics (age, female, African American, Hispanic)
- Private pay rather than public or self-pay (very few clients were private pay)
- HMO member (very few clients had HMO membership)
- Staff assessed problems at admission, 0-6 possible problems
- Client reported problems including Homeless, Disabled, Prior Arrest
- Client full-time employment
- Number of prior detoxifications (based on client report at admission)
- Maximum frequency of substance use in the 30 days prior to admission
- Treatment modality (compared to Non-methadone Outpatient)
- Primary problem substance at admission.

A summary of findings is presented in Exhibit III-16, and a full description of the logistic regression results is in Appendix B.

EXHIBIT III-16
FACTORS ASSOCIATED WITH REDUCED OR ELIMINATED DRUG AND ALCOHOL USE AT TREATMENT EXIT

Factor	Effect in Model
Time	The likelihood that clients reduced or eliminated drug or alcohol use declined slightly among non-first timers but not among first timers since July 1991.
Treatment Duration	Remaining longer in treatment increased the odds that first timers and non-first timers reduced use, and that first timers eliminated use. Each additional day in treatment increased the odds of a favorable outcome by .1 to .2 percent.
Completion	Completing treatment increased the odds of reduced and eliminated use by 2.8 to 4.8 times, for both first timers and non-first timers.
Race/ Ethnicity	African Americans and Hispanics (first timers and non-first timers) were less likely to reduce use or give up use relative to whites.
Gender	Women were neither more nor less likely to reduce or eliminate drugs compared to men, according to these models.
Age, Marriage	Older clients (first timers and non-first timers) were more likely to have favorable outcomes, as were clients who were married.
Employment	Employment at admission did not predict reduced or eliminated use.
Treatment Setting	Residential treatment clients had a higher likelihood of reduced and eliminated use at treatment exit compared to outpatient treatment first timers and non-first timers. Compared with Non-methadone Outpatient clients, the odds of positive outcomes were 7 times higher among Therapeutic Community and 8 times higher among Intensive Residential clients.
Problems Severity at Admission	Among first timers, more problems at admission *increased* the likelihood somewhat that clients reduce or eliminate use by treatment exit. Among non-first timers, more problems *lowered* the odds of favorable results. Employment had no significant effect, but being homeless lowered the odds that first timers reduce use at treatment exit.
Problem Drug	Clients treated for alcohol had lower odds of reduced use; non-first timers treated for marijuana had lower odds of reduced or eliminated use.
Past 30 Day Frequency at Admission	Virtually without saying, any frequency of use at admission was associated with worse outcomes than no past 30 day use. Different analyses, which are slightly less powerful overall and hence are not shown here, suggests that increased frequency (up to daily use) was associated with a commensurate drop in the odds of a good outcome, though this predictive model does not demonstrate that finding.

The principle factors we were interested in analyzing were the passage of time and treatment duration. Non-first timers admitted later in the decade were more likely to have positive outcomes than non-first timers admitted earlier. First timers admitted later in the decade were as likely to have positive outcomes as first timers admitted earlier. Longer treatment duration was also associated with positive outcomes. Remaining longer in treatment increased the

odds that first timers and non-first timers reduced use, and that first timers eliminated use. Each additional day in treatment increased the odds of a favorable outcome by .1 to .2 percent.

Several other factors were associated with greater likelihood of reduced or eliminated drug or alcohol use:

- Completing treatment[9]
- Older age
- Being white or Asian (any race/ethnicity other than African Americans or Hispanics).

First timers and non-first timers who reported alcohol and non-first timers who reported marijuana as their primary problems were less likely to reduce or eliminate substance use than clients who reported some other primary problem substance.

This analysis of drug and alcohol use at treatment exit is based upon information supplied by clients or, when clients have already left treatment, by treatment staff. It is well known that some clients return to substance abuse after leaving treatment, some of whom return to treatment. Other clients seek additional services to help them develop better life skills and avoid relapse. The following section describes information available in DACODS regarding the clients who returned to treatment.

4. LIKELIHOOD THAT CLIENTS WILL RETURN TO TREATMENT

Analysis of large, long-running State-managed clinical administrative databases such as DACODS offers insight into readmission patterns beyond what can be accomplished with most major treatment outcome studies. With nearly a decade of longitudinal data, it is possible to explore how many people return to publicly funded treatment, how long it takes for them to do so, and predictive factors associated with their return. Previous national studies generally have collected only limited information regarding returns to treatment.

This report presents data on whether or not clients returned to care some time after their baseline treatment encounter in Colorado's public treatment system. In this report, we focus on

[9] While some providers may require elimination of use as a criteria for treatment completion, removing completion from the logistic regression models did not substantially change the scope and direction of other findings and did not reduce the proportion of variance accounted for in the models by more than a couple of percent points. Hence, completion was left in the models.

only a single treatment re-entry to any type of treatment in Colorado's treatment system (not just their original treatment modality) to provide information on whether clients do or do not return to treatment after their baseline encounter. Determining whether a readmission was due to relapse, change in modality or service provider, or a natural progression of care was beyond this analysis. Future analyses should explore treatment episodes and utilization patterns over the course of several years.

This analysis of returns to treatment excludes clients who had left treatment and then reentered the same or a different treatment provider within 30 days. Treatment admissions that occur within 30 days of leaving a prior treatment are categorically defined to be continuation of the same treatment episode. This is consistent with prior studies of treatment readmission (e.g., Luchansky and He, 1999).

There are methodological challenges in analyzing treatment readmissions. Clients who entered and left treatment more recently literally had less of an opportunity to re-enter than did clients who entered and left earlier in the decade. Without controlling for this, it would appear that the likelihood that clients re-enter treatment decreases over time. Two strategies can address such challenges. The first strategy is to create a standardized follow-up period for determining whether clients returned to treatment, such as one year following exit from the first treatment to calculate "simple" readmission rates. The second strategy is to employ statistical "survival analysis" techniques to project readmission rates while controlling for the truncated follow-up periods for more recent versus earlier clients.

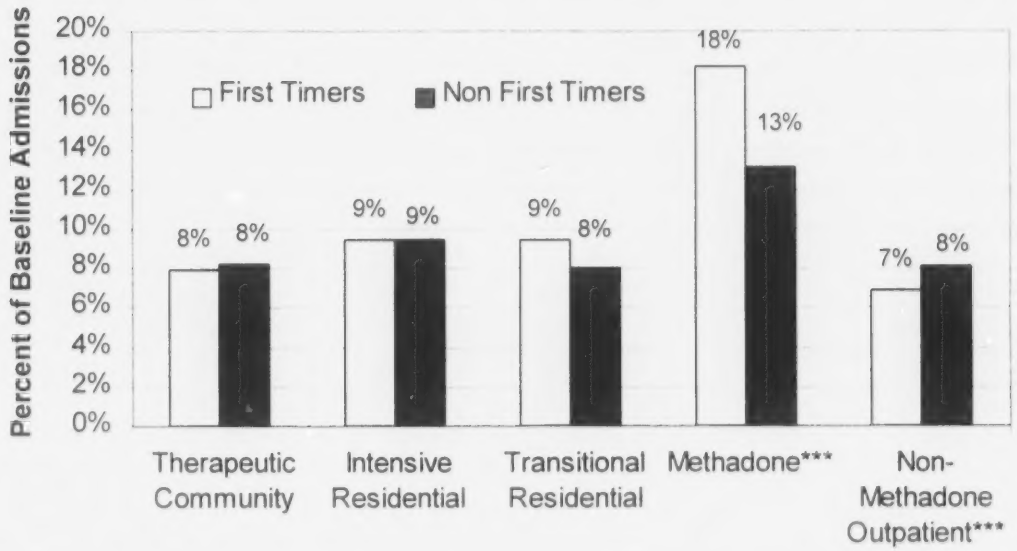
4.1 Treatment Re-entry within 12 Months

Analysis of DACODS data reveal that about 8 percent of clients in Colorado returned to treatment in Colorado within 12 months of leaving a given treatment episode. This finding is based on a simple proportion analysis of clients with a second admission record on file in Colorado, who had been admitted between 1991 and 1997 and left treatment by the end of 1997 (assuring we had at least 12 months to monitor readmissions during the analysis period). Differences between first timers and non-first timers were minuscule except for Methadone treatment, where 18 percent of first timers returned within a year compared to only 13 percent of non-first timers (Exhibit III-17).

Clients who returned to treatment in another State or in any of Colorado's non-publicly funded treatment providers could not be identified in this analysis and therefore are considered

"non-reentry" clients. Moreover, these analyses exclude clients who had left their baseline treatment and re-entered the same or a different treatment provider within 30 days.

EXHIBIT III-17
PROPORTION OF CLIENTS WHO RETURNED TO TREATMENT WITHIN A YEAR FOLLOWING TREATMENT EXIT, BY MODALITY



Note: Data are based on 37,448 clients who left treatment with valid admission and discharge records, and for those clients who returned to treatment, a valid second admission record. These data exclude clients who returned to treatment within 30 days of the end of their baseline treatment as that is categorically defined to be a continuation of the same treatment episode. ***Differences are significant at $p<.0001$.

The simple proportion of clients who returned within 12 months declined each year between 1991 and 1997 (Exhibit III-18). The proportion of first timers returning within a year dropped from 10 percent for clients admitted in 1991 to 5 percent for clients admitted in 1997. The proportion of non-first timers returning within a year declined from 9 percent for clients admitted in 1991 to 4 percent for clients admitted in 1997. These findings were generally consistent within modalities as well.

EXHIBIT III-18
PROPORTION OF CLIENTS WHO RETURNED TO TREATMENT WITHIN A YEAR FOLLOWING TREATMENT EXIT, 1991-1997

Admission Year	Percent with Second Admission Record Filed Within 12 Months	
	First Timers	Non-first Timers
1991	10%	9%
1992	9%	9%
1993	9%	8%
1994	9%	8%
1995	9%	8%
1996	7%	7%
1997	5%	4%

Note: Data are based on analyses of 37,448 clients who left treatment with valid admission and discharge records, and for those clients who returned to treatment, a valid second admission record.

These data are informative regarding treatment readmissions, but leave many questions unanswered regarding the factors that contribute to the likelihood that clients will return to treatment. Section 1 of this chapter outlined important changes in client populations during the 1990s that also may partly account for the changes over time in readmission rates. The next section describes the results of proportional hazard survival analyses that examined multiple factors associated with treatment readmission.

4.2 Survival Analysis of Treatment Re-entry

Survival analysis techniques were used to determine how long clients would be expected to remain out of treatment under alternative scenarios. Survival analysis is a technique that has been applied in health care research, where a fundamental goal is literally augmenting survival for people with health problems. This technique has been applied to behavior and other allied health outcome analyses over the last few decades (e.g., Mojtabai, Nicholson, and Neesmith, 1997; Luchansky and He, 1999). The term "survival" is not intended to be pejorative.

Survival analysis techniques should be used for outcome data that are "censored" by the end of a study period. Data are said to be "censored" when an expected event (e.g., treatment readmission) does not occur within the analysis time frame. To illustrate, clients admitted later in the decade literally had less time to return to treatment than clients who entered earlier. It is

BEST COPY AVAILABLE

possible to know how many clients admitted in 1991 returned to care by 1998, but we do not yet have data on how many clients admitted in 1998 returned to care seven years later. Survival analysis proportionately adjusts the censored cases. This analysis was designed to answer the following questions:

- Are there differences across baseline treatment modality that indicate clients will return (to that modality or any other), all other considerations being equal?
- What client characteristics, problems, and substance abuse patterns are associated with increased or decreased likelihood of returning to treatment?
- Do clients who are in treatment longer have less (or more) likelihood of returning to treatment?
- What role does treatment exit status (e.g., completion versus non-completion) and substance use at time of treatment exit play in predicting return to treatment?
- Is the likelihood of returning to treatment increasing or decreasing with time?

We used Cox proportional hazards regression survival analysis techniques (SPSS Inc., 1997) with the DACODS data. Cox regression permits many independent variables to be analyzed simultaneously while adjusting for censored data.

We stratified the survival analysis according to whether clients had any prior treatment experience (first timers vs. non-first timers). We also tested additional models that included the variable for any prior treatment experience (not shown). While the variable for "prior treatment" was statistically significant ($p=.022$), the coefficient suggested that first timers were only slightly more likely to return to treatment, or do so sooner, than non-first timers. We also estimated models for each modality (not shown), but no clear lessons or patterns emerged from the analysis. A detailed description of the factors studied in the Cox proportional hazards regression are included in Appendix B. Briefly, the regressions analyzed the following factors:

- Elapsed time from July 1991 to the client's admission date (time "index")
- Treatment duration (continuous variable, in days)
- Successful treatment completion (dichotomous variable)
- Client demographics (age, female, African American, Hispanic)

- Private pay rather than public or self-pay (very few clients were private pay)
- HMO member (very few clients had HMO membership)
- Staff assessed problems at admission, 0-6 possible problems
- Client reported problems including homeless, disabled, prior arrest
- Client full-time employment
- Number of prior detoxifications (based on client report at admission)
- Maximum frequency of substance use in the 30 days prior to admission
- Maximum frequency of substance use in the 30 days prior to treatment exit
- Treatment modality (compared to Non-methadone Outpatient)
- Primary problem substance at admission.

Full results from the final Cox proportional hazards regression are presented in Appendix B, and significant relationships are summarized in Exhibit III-19. Generally speaking, clients were less likely to return to treatment if they:

- Relied on private payment for their treatment
- Were admitted later rather than earlier in the decade
- Completed treatment successfully
- Were white rather than Hispanic or African American
- Were relatively older
- Had fewer problems assessed at admission and had never been arrested
- Were in treatment primarily for marijuana or alcohol
- Were not treated in Intensive Residential or Methadone treatment settings.

Treatment duration was significant ($p<.0001$) and yet the coefficient was nearly flat (odds ratio of 1.000), making interpretation impossible. Moreover, infrequent substance use at treatment exit

was a strong predictor that clients would return to treatment compared to no use at treatment exit, and yet increasing frequency had no significant effect on readmission.

EXHIBIT III-19
FACTORS ASSOCIATED WITH LOWER LIKELIHOOD THAT CLIENTS RETURN TO TREATMENT

Vairable	Odds Ratio
Private Pay Rather than Public or Self Pay	1.486***
Primary Problem Substance is Alcohol Rather than Other Substances	1.435***
Successfully Completed Treatment	1.408***
Primary Problem is Other Substances Rather than Heroin	1.294**
White Rather than African American	1.270***
Non-methadone Outpatient Rather than Intensive Residential Setting	1.259***
Primary Problem Substance is Marijuana Rather than Other Substances	1.256***
Therapeutic Community Rather than Non-methadone Outpatient	1.230*
Never Arrested	1.180***
No Use of Substances in 30 Days Before Exit, Rather than Infrequent Use (1-3x/month)	1.177**
Infrequent Use (1-3x/month) at Admission Rather than No Use at Admission	1.126*
White Rather than Hispanic	1.106**
Fewer Problems Assessed by Staff at Admission	1.038***
Relatively Older Age (1 year increments)	1.008***
Admission Later in 1990s Relative to 7/91	1.003***

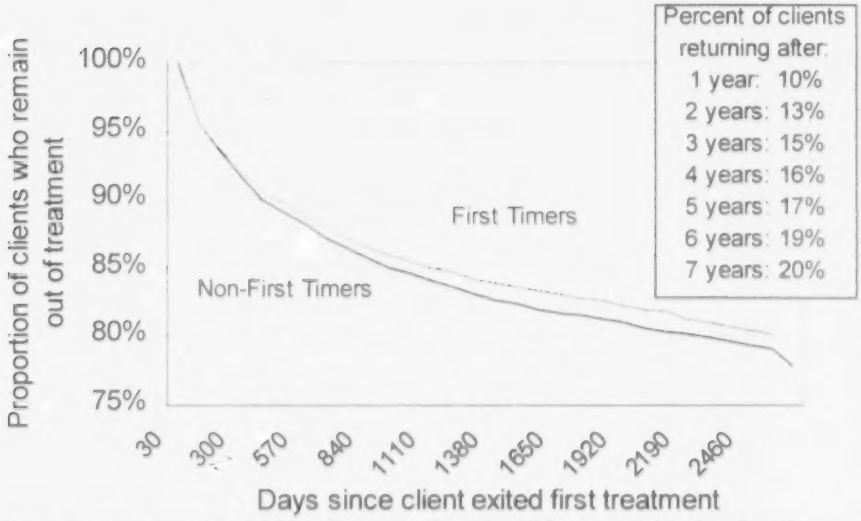
Note: Data are based on 24,274 client records with valid, non-missing data for all variables. To interpret results: odds ratios are displayed, where a value greater than 1 indicates the factor is associated with *lower* likelihood of clients' returning to treatment. Values less than 1 would represent factors associated with *higher* likelihood of treatment readmission; these have been converted and their definition in the table reversed so that the magnitude of factors can be more easily compared. Modality analyses handled Non-methadone Outpatient as a reference category; hence, they are expressed relative to Non-methadone Outpatient. Drug use frequency analyses were analyzed relative to the "No Use" category for admission or discharge frequency. Treatment in Methadone settings was associated with higher likelihood of return to treatment, but the comparison with Non-methadone Outpatient as a reference category is difficult to interpret.
***$p \leq 0.001$; **$p \leq 0.01$; *$p < 0.05$.

Survival analysis also can produce survival "curves" that show the change in the likelihood that clients will remain out of treatment for another incremental unit of time (Exhibit III-20). This survival analysis demonstrates that over the course of seven or more years, the Colorado treatment system would expect to see approximately 20 percent of clients who have had one treatment experience return for follow-up treatment.

- By the end of the first year, 10 percent of clients are expected to return
- By the end of the third year, a total of 15 percent are expected to return
- By the end of the seventh year, a total of 20 percent are expected to return.

The curve flattens by the end of this analysis period: it is therefore unclear whether substantially more clients will return beyond the seventh year. Non-first timers were slightly more likely to return to treatment or to return sooner than first timers. Again, all survival analyses excluded those clients who returned to treatment within 30 days of exiting their first treatment as they were categorically considered to be transfers to continuing care.

EXHIBIT III-20
SURVIVAL ANALYSIS OF WHETHER AND WHEN CLIENTS WILL RETURN TO TREATMENT FOLLOWING DISCHARGE



Note: Data are based on 24,274 client records with valid, non-missing data for all variables. Curves are the result of the Cox proportional hazards regression model outlined above, stratifying for first timers and non-first timers. Survival functions displayed are estimated at the means of the model covariates.

The next chapter summarizes these results and identifies implications for future research, policy, and practice. Many lessons emerged from this analysis that can inform and guide future analyses of State-managed clinical administrative data. These lessons are also identified in the next chapter.

IV. Summary and Lessons Learned

IV. SUMMARY AND LESSONS LEARNED

Colorado's State-managed clinical administrative database contains sound and complete data, the analysis of which enhances substance abuse services research. NEDS greatly appreciates Colorado's offer to provide access to the DACODS data to conduct secondary analysis. This analysis of Colorado's DACODS database presents findings on 54,049 clients admitted to publicly funded treatment in Colorado for the first time between July 1991 and February 1999. Three prominent features of the DACODS data bolstered these analyses:

- First, Colorado supplied matching treatment exit data for 74 percent of the admission records, permitting analyses of treatment duration and exit status.
- Second, DACODS data are very clean and relatively complete. Improvements in DACODS made in 1991 strengthened the data over the subsequent years.
- Third, by implementing unique client identifiers in the 1980s, Colorado enabled analysts to track clients as they entered and left treatment over time.

This analysis of DACODS "scratches the surface" of this data set and constitutes a first step in pursuing other highly valuable analyses using this data set. This analysis also points to the potential power of replicating these analyses and conducting other analyses with data from other State data systems.

Chapter 3 presented preliminary results on trends in "baseline" admissions to publicly funded treatment in Colorado. The chapter summarized patterns and trends in client admission profiles, treatment experiences, drug and alcohol status at treatment exit, and readmission rates. Several clear and consistent findings emerged from this analysis regarding effectiveness of services. Over the decade, 42 percent of clients successfully completed treatment and 17 percent more had completed at least half of their treatment before leaving. By the time they left treatment, 66 percent of clients had not used drugs or alcohol in the 30 days before their treatment exit, and 75 percent had reduced use of drugs or alcohol. Survival analysis indicates that about 10 percent of clients would return to a Colorado publicly funded treatment provider within a year. This chapter discusses the results and identifies lessons learned for future analyses.

1. SUMMARY AND DISCUSSION

The DACODS analyses were designed to explore the following areas: (1) client characteristics, (2) treatment duration and completion, (3) drug and alcohol use at treatment exit,

and (4) the likelihood that clients would return to treatment again. A summary and discussion of each of these topics follow.

1.1 Baseline Client Characteristics

This analysis sought answers to the questions: *What were the characteristics of clients entering care for the first time in Colorado's public system as well as the first time anywhere? How have these characteristics changed over time?*

In 1991, the typical baseline client entering Colorado's publicly funded treatment system was male (73 percent), white non-Hispanic (62 percent), and 29 years old (though 12 percent were less than 17 years old). Alcohol was the most frequently cited primary problem substance for baseline clients entering treatment in Colorado, though 57 percent of baseline admissions indicated they in fact had a problem with two or more substances.

Following are several significant changes in the clients served as reflected in Colorado's treatment system that have taken place between 1991 and 1998:

- The proportion of clients who were adolescent, female, and Hispanic increased.
- The proportion of clients with three or more problems (family, social, marital, school, work, physical) decreased.
- The proportion of clients citing alcohol as their primary substance problem decreased while the proportion citing marijuana increased.
- The proportion of clients who report problems with more than one substance at baseline admission increased.

Some of the increase in poly-substance abuse may result from improved assessment procedures used by provider staff and an increased understanding and recognition of poly-substance abuse among both staff and their client populations.

The increase in the proportion of women, youth, and Hispanics points to the need to be sure that treatment providers are equipped to appropriately address the gender, age, and culture-specific treatment requirements. More information is needed regarding the relative role policies may have played a part in targeting or attracting these clients into treatment, versus emerging trends in local substance abuse patterns.

1.2 Treatment Setting, Duration, and Completion Status

This analysis sought answers to the questions: *What type of treatment experience did clients have for their baseline experience in Colorado, how long did it last, and what was their status at treatment exit? How have these patterns changed over time?*

During the 1990s, about 66 percent of baseline clients started off in Non-methadone Outpatient treatment, another 15 percent started in Intensive Residential treatment, and the rest went to Methadone, Transitional Residential, and Therapeutic Community providers. The proportion of clients who entered Non-methadone Outpatient treatment increased slightly and the proportion entering any of the residential modalities decreased.

About 40 percent of clients were discharged as having successfully completed treatment. More first timers than non-first timers successfully completed treatment. The proportion of clients who successfully completed treatment has declined slightly between clients admitted in 1991 and clients admitted in 1997. The proportion of successful discharges fluctuated within modalities over this period. Averaging the fluctuating completion rates over this period contributes to the impression that the entire system has on average maintained consistent completion rates.

The median length of stay in Non-methadone Outpatient treatment was about 115 days, which was longer than the medians for clients who exited from treatment in any of the other modalities. In Methadone treatment providers, where many clients remain in treatment for long periods (potentially life-long), the median duration in treatment for those clients who left treatment was about 85 days. The median duration in Therapeutic Communities, Transitional Residential, and Intensive Residential was about 68 days, 40 days, and 22 days, respectively.

Prior research has demonstrated that longer treatment is generally associated with improved outcomes:

- Analysis of the Treatment Outcome Prospective Study found that longer stays in Therapeutic Communities improved outcomes (Condelli and Hubbard, 1994).
- Analysis of Veterans Administration data concluded that longer community-based residential treatment lowered six month and one year readmission rates (Moos, Pettit, and Gruber, 1995; Peterson et al., 1994).

- Analysis of the CSAT-sponsored Target Cities data collected in Boston identified a "threshold" treatment duration that predicted better outcomes for clients who crossed that threshold (Schwartz et al., 1997).

- Analysis of the Drug Abuse Treatment Outcome Study also found that clients who remained in treatment for longer than three months had better outcomes (Simpson et al., 1997).

In a recent analysis of Methadone treatment, Greenfield (1999) concluded that outcomes were best among clients who were continuously enrolled in Methadone treatment during the follow-up period, and that outcomes were better among clients who were treated at least three months before they left treatment compared to clients treated less than three months.

This analysis of DACODS also indicates that treatment duration declined among baseline admissions to Non-methadone Outpatient, Methadone, and Therapeutic Communities, but increased among first timers in Intensive Residential and Transitional Residential settings even after controlling for changes in client characteristics. Further information on the factors that contributed to declining treatment duration as seen in this analysis of DACODS these changes are needed. For example, it could be that treatment providers have implemented more stringent utilization review protocols or are responding to other third-party payer requirements. Treatment outcomes such as drug and alcohol use need to be monitored in light of the declining treatment duration.

1.3 Drug and Alcohol Use at Treatment Exit

This analysis sought answers to the questions: *How did Colorado clients' substance use patterns change by the end of treatment? What factors are associated with reduced or eliminated substance use? How have these patterns changed over time?*

Among the clients treated in Colorado's publicly funded treatment programs in the 1990s, about 66 percent had eliminated use and an additional 8 percent had reduced use by the time they left treatment. Daily use declined from 28 percent of clients at admission to 10 percent by the time they left treatment. Non-first timers were more likely than first timers to have reduced drug and alcohol use at treatment exit (79% compared to 71%). Of these, a significant percentage eliminated use altogether (70% compared to 63%). These differences alone highlight the need to extend this analysis to monitor clients as they change from their baseline treatment experience in Colorado to second, third, and additional treatment experiences.

DACODS provides a multiyear perspective on drug and alcohol use at treatment exit. This analysis found no change in the likelihood that first timers entering treatment later rather than earlier in the decade would have reduced or eliminated use. Among non-first timers, however, clients admitted later in the decade were slightly less likely to have reduced or eliminated use as clients admitted earlier in the decade.

DACODS is limited, however, in that it only includes information on use at treatment exit. Some clients will increase use of drugs or alcohol after leaving treatment. Follow-up studies are necessary to determine whether treatment exit outcomes hold up over time and as clients are exposed to new pressures and risks.

1.4 Likelihood that Clients Return to Treatment

This analysis sought answers to the questions: *What was the likelihood that clients in Colorado would return to treatment in Colorado after treatment exit? What factors are associated with readmission? How have these patterns changed over time?*

Clients returning to treatment may be viewed as a positive or a negative outcome. For some clients, readmission to care is the best way to continue receiving support to remain free of drugs or alcohol, especially if the "readmission" reflects after care or a step-down progression in treatment services. For others, readmission signals a relapse and return to drug and alcohol abuse. For yet others, "readmissions" may take place when a client leaves one provider and starts again elsewhere whether by the client's choice or through referral by the provider. Some stakeholders equate a treatment readmission to failure at a previous treatment, while other stakeholders view a readmission as a natural step on a path toward recovery.

Readmission to treatment after a relapse to substance abuse is almost always more desirable than not pursuing treatment after relapse. Likewise, continuing care in a less intensive treatment modality to sustain reduced or eliminated use is also beneficial. Understanding the relationships between drug and alcohol outcomes and treatment readmission would be important for policy and practice.

Statistical survival analysis techniques were used to estimate the likelihood that clients would return to treatment over time. Colorado can expect to see approximately 20 percent of its baseline clients returning for a second treatment episode at a publicly funded Colorado treatment provider within seven years of leaving their "baseline" treatment episode. Half of these clients

(10% of total clients) will be readmitted within the first year. Non-first timers were slightly more likely to return to treatment or return sooner than first timers. Survival analysis techniques provided a more valid assessment of treatment readmissions than would have been possible with simple descriptive analysis of readmission "rates."

A similar analysis was performed recently with Washington State clinical administrative data. Luchansky and He (1999) analyzed clients who returned to treatment. As in this report, the authors excluded clients who returned to treatment within 30 days (categorically defining these readmissions to be "transfers") and used proportional hazard regression (survival analysis) techniques for their analysis. They concluded that, of the clients who were admitted and who ended treatment in 1995, 24 percent had a readmission on file within one year, 17 percent had a readmission within two years, and 12 percent had a readmission within three years. Clients who were readmitted were most likely to enter outpatient care. Clients were more likely to be readmitted if they had not completed treatment, were female, or were treated in inpatient settings only during the reference year.

Through this analysis, factors associated with two major types of intermediate outcome were identified: reduced or eliminated drug and alcohol use at treatment exit, and readmissions to care in Colorado's publicly funded treatment system. Comparing the results of these can help identify patterns that underscore both substance use and readmissions. Several factors predicted whether clients had better drug and alcohol outcomes, lower likelihood of treatment readmission in Colorado, or both. These are summarized in Exhibit IV-1.

EXHIBIT IV-1
STRONG FACTORS ASSOCIATED WITH INTERIM OUTCOMES IN DACODS

Factors Predicting Reduced or Eliminated Substance Use	Factors Predicting Lower Likelihood of Treatment Readmission
■ Longer treatment duration ■ More intensive treatment setting (e.g., residential rather than outpatient) ■ Married (vs. never been married) ■ Were admitted to treatment *earlier* in the decade compared to later.	■ Private payment for treatment ■ Primary problem: alcohol, marijuana ■ Primary problem: not heroin ■ Never arrested ■ Admitted *later* in the decade compared to earlier.

Factors Predicting Both Reduced or Eliminated Substance Use and Treatment Readmission
■ Successfully completed their baseline treatment ■ Relatively older age (rather than younger) ■ Had fewer problems assessed by staff at admission ■ Were white, rather than Hispanic or African American.

Anticipating some clients moving in and out of treatment may help treatment providers establish greater continuity and tailor treatment somewhat to first time versus repeat admissions. Analysis of DATOS found that clients who return to care have more problems than first time admissions (Anglin, Hser and Grella, 1997). Similarly, analysis of the St. Louis Target Cities data also found that clients with previous treatment experience tended to have greater levels of psychiatric symptomatology and other problems (Claus et.al., 1999).

2. LESSONS LEARNED FROM THIS "CASE STUDY"

This analysis of Colorado's DACODS data constitutes a pioneering effort by the NEDS contract to analyze State-managed clinical administrative data. As such, this analysis serves also as a "case study" regarding the analysis of such data. In addition to the data findings summarized in Section 1 of this chapter, NEDS analysts have identified several lessons that can inform future work with DACODS or other similar data.

Chief among the lessons are that Colorado's investment in obtaining high quality data has paid off by permitting rigorous and detailed analyses. Less than 1 percent of all admission records in DACODS were either duplicative or invalid; moreover, of the remaining records, only 5 to 6 percent appeared to have missing or invalid data elements for any given variable. Overall, Colorado was able to supply matching treatment exit data for 74 percent of the baseline clients admitted to care during the 1990s.

A second lesson is that data quality suffers when insufficient time is allowed for data planning. Colorado approved managed care in February 1997 for implementation in July 1997. During this rapid turnaround, the State had to redesign data forms, create data manuals, revise data dictionaries, develop data submission and editing processes, and create new file structures—in addition to all the other steps that accompany a transition to managed care. Moreover, the managed care organizations responsible for implementing the system had limited experience gathering and supplying the data required by the State (personal communication with Bruce Mendelson, 2000). As a result, the proportion of admissions with matching valid discharge records declined from 79 percent in 1996 to 48 percent in 1997. Adequate planning time could prevent similar problems in the future.

DACODS data are also very clean and relatively complete. Improvements in DACODS made in 1991 strengthened the data over the subsequent years. Further efforts to improve upon the consistency of coding and handling of missing data will increase the analytic value of these

data. It should be possible, moreover, systematically to assess the validity and reliability of data collection protocols used to generate these data. In particular, follow-up studies of clients who have left treatment can inform treatment system managers about the quality of data reported at treatment exit.

By implementing unique client identifiers in the 1980s, Colorado also enabled analysts to track clients as they enter and leave treatment over time. Some State systems do not yet have unique client identifiers. Moreover, the actual unique identifiers change from State to State, preventing the tracking of clients from one State system to another.

There are no recognized standards for the analysis of State-managed clinical administrative data. In preparing our analysis of treatment readmission, clients who were admitted to care within 30 days of leaving their first treatment experience were categorically defined to be "transfers" rather than "readmissions" and were excluded from our analysis. This analytic decision was made based upon consultation not only with Colorado officials, but analysts in two other States. Data analysis decisions can affect the results obtained, and there must be "buy in" to these decisions before the analyses are completed.

There are many "levels" of data in a complex treatment system, and "baseline admissions" and "readmissions" take on different meaning depending on the level at which the audience is focused. A client may be a "baseline" (first time) admission to a specific treatment provider, but not within a State system or they may be a baseline admission within a State system, but may have been in treatment in the private sector or in another State. This report sought to differentiate these levels to the degree possible by separating baseline admissions to Colorado's publicly funded treatment system from readmitted clients, and to further differentiate clients who reported no prior treatment (first timers) from those who had prior treatment somewhere else (non-first timers). It is necessary to be clear and specific about the levels and types of clients being presented in an analysis.

Sound State-level clinical administrative data become even more useful when they are combined or linked with other critical information. This analysis of DACODS, for example, did not have available detailed services or cost data. Each treatment episode is undifferentiated. Understanding services and cost information can, at a minimum, help establish the context for changes observed in the data, if not actually provide additional variables to incorporate into the analyses. Some treatment systems include services or cost data—for example, as part of a

reimbursement system—that could be connected to the type of client-level data analyzed for this report.

Additional information on what happened to clients after they left treatment (beyond whether or not they returned for care) would also augment the analyses presented here. The interim outcomes noted in this report could change after clients leave treatment. Some clients also may have re-entered treatment with private treatment providers or providers in other States. Accordingly, the analyses contained in this report would ideally be paired with representative follow-up data and/or data from other States to assess longer-term impacts of treatment. Undertaking such follow-up studies requires a careful investment of time and resources to assure the highest quality and most useful data. It is imperative that State-managed clinical administrative data be augmented with treatment follow-up data and other data on client histories (abuse patterns, etc.) in ways that efficiently produce far more and better information for policy and practice.

V. Implications and Next Steps

V. IMPLICATIONS AND NEXT STEPS

The characteristics of clients and the utilization of treatment services in Colorado's publicly funded treatment system has changed somewhat during the 1990s. This analysis also demonstrates that the DACODS data set is poised to support even more rigorous examination that will provide valuable information for the substance abuse treatment field. This chapter reviews a series of implications for research, policy and practice, and describes a set of proposed subsequent analyses of the DACODS data set or similar data.

1. IMPLICATIONS

The following implications for research, policy, and practice draw from both the specific data findings, as well as lessons from the "case study" of analysis of State-managed clinical administrative data described in Chapter IV.

1.1 Implications for Research

Research can strengthen the quality and utility of State-managed clinical administrative data and extend analyses of this valuable data source. Implications for research primarily involve using DACODS for comparison with other data, assessing and improving the quality of clinical administrative system data, performing more subgroup analyses with this data, and extending research to assess multiple episodes and cumulative effects of treatment. Specific implications for research include:

- Assess the reliability and validity of State-managed clinical administrative data such as DACODS, and develop strategies to improve upon data quality where necessary. Validity and reliability is of particular concern with treatment exit data, when treatment provider staff sometimes must cull information from fragmented records and other information sources or just apply their best judgement when completing forms.
  - Assess the reliability, in particular, of treatment exit date and status at treatment exit for clients who dropped out of outpatient treatment. There may be differences in how some staff handle this compared to others.
  - Assess the reliability and validity of single item diagnostic and problem severity assessment items. Do staff generally employ consistent criteria and methods for scoring these items? Researchers and evaluators may target more subjective data elements such as psychiatric problems for this type of analysis.

- Extend the analyses summarized in this report. Our analyses identified major trends and major level effects. Subsequent analyses should expand upon what is reported here.

  - Analyze very short treatment durations. This report did not consider the outcome of clients who had very short treatment experiences (lasting only one to two days). While fewer than 5 percent of clients had such short experiences, it is important to know whether they re-entered treatment, and to know whether there were characteristics of these short stay clients that treatment providers could use to identify high risk clients.

  - Profile changes in admission severity from first through last treatment. Are clients generally presenting with reduced problem severity, or are the most severe and impaired clients the ones who are most apt to return? Conventional wisdom may predict the latter.

  - Break crack from powdered cocaine (by subdividing route of administration), and reanalyze drug use data.

  - Employ survival analysis techniques to analyze treatment duration (e.g., see Magura, Nwakeze and Demsky, 1998) and factors associated with shorter—versus longer—duration treatment episodes. When analysis files are created from State-managed clinical administrative data sets, arbitrary "end points" are selected at which time many clients are still in treatment. This causes "censoring" of treatment duration that can be addressed analytically with survival analysis techniques.

- Focus future analyses more on the relationships between emerging substance abuse patterns and shifting demographics. Researchers and evaluators could pinpoint substance abuse patterns in specific racial/age/gender groupings.

  - Determine the relationships, over time, in primary substance reported at admission, race/ethnicity, gender, age, and several client status and behavior measures.

  - Identify subgroups to help explain intermediate outcomes and identify more specific programmatic and policy implications.

- Analyze the "cumulative effects" of treatment. Multiple admissions may be necessary to help some clients achieve desired outcomes.

  - Combine treatment episodes and calculate a "pooled" treatment duration.

- Analyze the step up/down phenomena for clients who left treatment and then re-entered care within 30 days. This report considered a second admission within 30 days to be an extension of the first admission; further analysis can portray the types of treatment accessed within that 30-day period.

- Analyze factors associated with readmission to different versus the same level of care anytime after 30 days from baseline treatment discharge.

- Document the relative intermediate outcomes (e.g., status at discharge, drug use at discharge) for clients after each respective treatment admission.

- Implement unique client identifiers and seek to adopt a uniform unique client identifier that permits pooling of data across other data systems. Unique client identifiers help assure that multiple treatment episodes can be connected for unduplicated clients. Develop national unique but anonymous client-level identifier protocols.

- Implement provider identifiers and integrate provider-specific service data with other clinical data. DACODS did not include provider identifiers, precluding our ability to identify provider-level influences on client-level variables.

  - More provider-specific data on costs and comparative services would augment our understanding of treatment beyond simply the level of care and the treatment duration.

  - Conduct hierarchical linear modeling (HLM) analyses to assess the relationships between provider-level changes and client-level changes.

- Incorporate relevant funding information into the analysis. Data on funding levels and treatment provider expansions or contractions may help explain some of the client characteristics and treatment duration changes.

  - Include such information as independent variables in multivariate models, or conduct pre/post-comparisons surrounding important implementation dates.

  - Obtain funding variables such as (1) revenue per client, either averaged within a modality or, ideally, averaged for a specific provider; and, (2) total revenue per provider agency or per treatment unit within a provider agency.

- Obtain policy information and incorporate into the analyses. Examples of policy variables may include binary variables coded each year (or month) for the status of managed care implementation, or the implementation of welfare reform programs.

- Develop multi-state databases that pool MIS records. States would have the ability to match client records by unique identifiers to create a database on cross-state "shared clients." One strategy could be to use Social Security Numbers solely for matching client records, then deleting such identifying information when the data are analyzed to assure client identities are not disclosed.

- Use this State-managed clinical administrative data to establish the impact of managed care implementation in July 1997 on Colorado's publicly funded treatment system. Although discharge record response rates plummeted in the two years following the State's implementation of a managed care system, more recent discharge data are more complete. Analyze admission patterns, discharge status, duration and readmission (such as those outlined in this report) for FY 1999-2001 and then compare findings with results from 1994-1997.

- Augment MIS data with post-treatment follow-up information on a random sample of the clients. Using population data as a sampling frame allows for the development of valid sample weights for entire treatment systems. This was the approach used by Gerstein et al. (1994), in CALDATA.

Finally, State-managed clinical administrative data may be linked with ancillary data systems. Data systems in criminal justice, health, employment, and welfare systems all can be—and have been—mapped to substance abuse data systems that use common unique client identifiers. These analyses can help identify "shared clients" and determine whether substance abuse treatment leads to reductions in resources required by other agencies for the same clients.

1.2 Implications for Policy

Substance abuse treatment has remained consistently effective over the decade, but changing client characteristics and needs, combined with emerging policy shifts toward managed care and changes in insurance coverage, suggest the need to examine new data in the future. Already Colorado is experiencing declining length of stays. Declining length of stay over the decade should also be monitored, as this may affect treatment exit and post-treatment outcomes. Specific implications for policy include:

- Consider developing clinical record standards to augment existing admission and treatment exit data standards that have been developed. The TEDS data system helped standardize many data elements across States, as was the case with Colorado and DACODS. Most States have additional data elements with a certain degree of comparability that could be used to compare with other States and potentially be pooled.

- Assess and improve the level of support as necessary for assuring high quality State-managed clinical administrative data, particularly in light of recent technological innovations.

  - Investments in higher levels of data quality and more comprehensive data systems may produce even more useful information for policy than currently exists.

  - With Web-based technologies, States can undertake development of systems to support more economical collection and analysis of State-managed clinical administrative data.

  - Assess whether treatment providers are appropriately financed to gather and report the level and quality of data desired by States.

- Determine whether existing efforts to establish State-level treatment follow-up studies are adequate and timely. States would benefit from having standardized post-treatment outcome studies for their entire service population. Such data would provide a stronger foundation for assessing treatment system performance and cost-effectiveness.

- Support treatment provider efforts to retain clients in treatment longer. Evidence compiled in this report suggests treatment duration and completion were strong predictors of intermediate outcomes such as substance use and treatment readmission. Do policy factors contribute to shorter length of stay and swings in treatment completion rates? Financing methods and funding levels should be assessed for their impact on length of stay.

- Assess why "private payment" turns out to be such a strong predictor of clients *not* returning to care. Ideally, private pay clients are simply more likely to access follow-on treatment in non-publicly funded providers. However, private pay policies that govern utilization of services may sometimes limit access to follow-up treatment. Determine whether clients who entered their "baseline" relying on private payment sources subsequently re-entered treatment without private payment sources. Policy makers need to understand this potential phenomenon.

- Strengthen systems that facilitate communication between providers when clients from one agency return to treatment at another provider. In Colorado, 20 percent of treatment clients may return to treatment over a 7-year period. It may be valuable for treatment providers to access prior information on clients who return. There may be concerns about sharing confidential information that policy officials would need to address.

- Maintain strong communications with health and mental health systems, and assure sufficient dialogue exists between State and local substance abuse treatment agencies and providers, schools, child welfare, and juvenile justice agencies who often see the same clients. The increase in the number of adolescents in Colorado's treatment system point to the need to reinforce communications. Colorado reportedly has taken steps in these directions, and additional policy analyses regarding factors that support or hamper these efforts may be helpful.

- Preserve data systems even in the midst of significant system changes. Colorado unfortunately saw a dramatic decline in rates of treatment exit forms that could be matched with admission records after the implementation of managed care in 1997. Officials there have stressed the importance of keeping data systems and data quality on the agenda in the midst of significant policy changes. With improvements in the data system since 1997, Colorado may now be in a better position to study the effect of managed care on the treatment system.

Finally, policy audiences can commission specific analyses of the impact of policy changes, specifically by relying on selected State-managed clinical administrative data systems. This may be important as questions about the impact of managed care, welfare reform, and criminal justice-based treatment innovations are posed to the substance abuse treatment field.

1.3 Implications for Practice

Some treatment providers in Colorado, and perhaps elsewhere, are seeing different types of clients today than they were 10 years ago. On average, clients are not staying as long in treatment and many clients will return to treatment later.

- Explore strategies to improve the effectiveness of treatment for youth and racial/ethnic minorities. In Colorado during the 1990s, youthful clients and racial/ethnic minorities were less likely to reduce or eliminate drug and alcohol and were more likely to return to treatment relative to their counterparts. As the treatment system shifts more toward youthful populations and racial/ethnicity minorities, managers will need to monitor outcomes closely and improve services as necessary.

- Assess treatment protocols to make sure they are appropriate for changing age, gender, and racial/ethnic compositions of clients. This may include outreach, intake protocols, case management, family services, and other clinical services. For example, treatment services to adolescents entail more work with parents, schools, and criminal justice systems. Providers should assess their relationships with these systems.

- Assess treatment protocols and treatment planning processes for special circumstances surrounding clients who reenter treatment. Returning clients typically will have more problems, and establishing continuity with prior treatment providers may help current treatment providers plan more effective interventions.

- Develop strategies to retain high-frequency drug and alcohol users and clients with more problems assessed at admission. More frequent drug and alcohol use and more severe problems at admission are associated with lower likelihood of completing treatment. Treatment providers need to seek out explanations using samples of cases from within treatment providers for why some clients complete treatment and others do not. Then treatment providers should consider whether and how to tailor treatment services to provide, perhaps, more intensive services to clients with more severe problems.

- Identify factors associated with premature treatment exit. What types of client are more likely to discontinue care, and why? What changes can be enacted to prevent this? Administrative data analysis can support this, particularly when supplemented with case-specific analyses.

Finally, providers ought to explore intake data protocols and procedures for reporting data to the State systems. Providers may have insights regarding how to streamline data submission procedures and enhance data quality.

2. NEXT STEPS FOR DACODS ANALYSIS

This report presents the first in a series of proposed analyses of the DACODS data set. A key feature underlying this analysis was the identification of baseline admissions to Colorado's publicly funded treatment system during the 1990s. This study included analyses of baseline admissions as they entered and left treatment, and projected the probability that clients would return to treatment in the future. Subsequent analyses may explore readmissions to treatment and the relationship between detoxification episodes and treatment episodes. The next proposed analyses would examine returns to treatment and the utilization of detoxification services.

2.1 Analysis of Returns to Treatment

The second proposed analysis would create typologies and a framework for assessing the impact of multiple treatment admissions. Key analysis questions for this report include:

- *What differentiates those who reenter treatment from those who do not?* What are the differences between clients who have only one treatment episode and clients who have multiple treatment episodes?

- *What constitutes a typical episode?* Based on where clients initiate treatment, into what setting do they transfer? How long does a break in treatment typically last before the treatment is clearly an entirely separate episode? Is there a typology of multiple admissions that comprise one contiguous treatment episode? Is there a clear pattern of sequential non-contiguous treatment episodes? What factors predict these typologies?

- *What are the cumulative effects of multiple treatment admissions?* How do client severity and drug use patterns change from one treatment episode to the next? How do outcomes assessed at treatment exit seem to change in relation to multiple treatments? Is there a threshold for cumulative treatment exposure that seems to predict favorable outcomes?

The key focus for the next proposed analysis will be upon describing episodes of care across multiple contiguous admissions, and assessing what we have termed "cumulative" effects of treatment. Recovery may not result from any one specific treatment experience, but rather be brought about through an iterative process of treatment engagement and social and behavioral change. This proposed analysis would disentangle the relationship of prior and subsequent treatment, intervening periods in between treatment exit and admission, and the progression to more or less intensive modalities.

2.2 Analysis of Detoxification and its Relationship to Treatment

Another proposed analysis would explore patterns of detoxification utilization that are either independent of or part of a treatment continuum. Analyses will include all 409,000 detox records and 100,000 treatment records.

- *Have detoxification clients changed over time?* Are more clients entering treatment with or without prior detoxification experience?

- *How are revolving detoxification and treatment patterns changing?* How many readmissions are there to detox, and what predicts readmissions? What is a client's status after one or more detox encounters? What predicts when clients go from detox to treatment? How well has the continuum of care concept worked for clients who appear to need treatment (e.g., based on admission severity drug or alcohol use patterns)?

State-managed clinical administrative data constitute a largely untapped reserve of information regarding substance abuse treatment clients, services, and interim outcomes. This paper summarized lessons learned from analysis of more than 54,000 clients at their baseline admission into Colorado's publicly funded treatment programs, between 1991 and 1998. This report also provided information that can guide subsequent development and analysis of similarly valuable data sets in other States. Ultimately, the analysis of rigorous administrative data can complement treatment follow-up studies to help identify what actually constitutes effective (and cost-effective) treatment.

References

REFERENCES

Anglin, M.D., Hser, Y., & Grella, C.E. (1997). Drug addiction and treatment careers among clients in the Drug Abuse Treatment Outcome Study. *Psychology of Addictive Behaviors, 11*(4). 308-323.

Battjes, R.J., Onken, L.S., & Delaney, P.J. (1999). Drug abuse treatment entry and engagement: Report of a meeting on treatment readiness. *Journal of Clinical Psychology, 55*(5). 643-657.

Caliber Associates (1999a). *National Evaluation Data Services, Steering committee report.* Fairfax, VA: Caliber Associates.

Caliber Associates (1999b). *Minimum Evaluation Data Set: Core data lists.* Prepared for the Center for Substance Abuse Treatment. Fairfax, VA: Caliber Associates.

Claus, R.E., Mannen, R.K., & Schicht, W.W. (1999). Treatment career snapshots: Profiles of first treatment and previous treatment cohorts. *Addictive Behavior, 24*(4). 471-479.

Condelli, W.S., & Hubbard, R.L. (1994). Relationship between time spent in treatment and client outcomes from therapeutic communities. *Journal of Substance Abuse Treatment, 11*(1). 25-33.

Craddock, S.G., Rounds-Bryant, J.L., Flynn, P.M., & Hubbard, R.L. (1997). Characteristics and pretreatment behaviors of clients entering drug abuse treatment: 1969-1993. *American Journal of Drug and Alcohol Abuse, 23*(1). 43-59.

Devine, P. (1999). *Integrated evaluation methods: A guide for substance abuse treatment knowledge generating activities.* Prepared for the Center for Substance Abuse Treatment. Fairfax, VA: Caliber Associates.

D'Aunno, T. & Vaughn, T. (1995). An organizational analysis of service patterns in outpatient drug abuse treatment units. *Journal of Substance Abuse* 7(1). 27-42.

D'Aunno, T., Vaughn, T., & McElroy, P. (1999). An institutional analysis of HIV prevention efforts by the nation's outpatient drug abuse treatment units. *Journal of Health and Social Behavior, 40*(2). 175-192.

Etheridge, R.M., Hubbard, R.L., Anderson, J., Craddock, S.G., & Flynn, P.M. (1997). Treatment structure and program services in the Drug Abuse Treatment Outcome Study (DATOS). *Psychology of Addictive Behaviors, 11*(4). 244-260.

Finigan, M. (1996). *Societal outcomes and cost savings of drug and alcohol treatment in the State of Oregon.* Prepared for the Office of Alcohol and Drug Abuse Programs, Oregon Department of Human Resources, and the Governor's Council on Alcohol and Drug Abuse Programs. Salem, OR: Office of Alcohol and Drug Abuse Programs, Oregon Department of Human Resources.

Gerstein, D.R., Johnson, R.A., Harwood, H.H., Fountain, D., Suter, N., & Malloy, K. (1994). *Evaluating recovery services: The California Drug and Alcohol Treatment Assessment (CALDATA).* Sacramento, CA: State of California, Department of Alcohol and Drug Programs.

Gerstein, D.R., Datta, A.R., Ingels, J.S., Johnson, R.A., and Rasinski, K.A. (1997). *Final report: National Treatment Improvement Evaluation Survey.* Chicago, IL: National Opinion Research Center.

Greenfield, L. (1999). *Methadone treatment outcomes in the National Treatment Improvement Evaluation Study.* Submitted to the Center for Substance Abuse Treatment under the National Evaluation Data Services contract. Fairfax, VA: Caliber Associates.

Hser, Y.I., Anglin, M.D., Grella, C., Longshore, D., & Prendergast, M.L. (1997). Drug treatment careers: A conceptual framework and existing research findings. *Journal of Substance Abuse Treatment, 14*(6). 543-558.

Hubbard, R., Marsden, M., Rachal, J., Harwood, H., Cavanaugh, E., & Ginzburg, H. (1989). *Drug abuse treatment: A national study of effectiveness.* Chapel Hill, NC: University of North Carolina Press.

Institute of Medicine. (1990). *Broadening the base of treatment for alcohol problems.* Washington, DC: National Academy Press.

Lewin Group. (1999). *SAMHSA managed care tracking study.* Contract to the Office of Managed Care, SAMHSA. Falls Church, VA: The Lewin Group.

Luchansky, B., & He, L. (1999). *Episodes and readmissions: Analyses from Washington State. An interim report.* [Prepared for the Department of Social and Health Services, Division of Alcohol and Substance Abuse.] Olympia, WA: DSHS, DASA.

Magura, S., Nwakeze, P.C., & Demsky, S.Y. (1998). Pre- and in-treatment predictors of retention in methadone treatment using survival analysis. *Addiction, 93*(1). 51-60.

McCusker, J., Willis, G., Vickers-Lahti, M., & Lewis, B. (1998). Readmissions to drug abuse treatment and HIV risk behavior. *American Journal of Drug and Alcohol Abuse, 24*(4). 523-540.

Mendelson, B. (2000). Colorado Alcohol and Drug Abuse Division. Personal Communication.

Moos, R.H., Pettit, B., & Gruber, V. (1995). Longer episodes of community residential care reduce substance abuse patients' readmission rates. *Journal of Studies on Alcohol, 56*(4). 433-443.

Mojtabai, R., Nicholson, R.A., & Neesmith, D.H. (1997). Factors affecting relapse in patients discharged from a public hospital: Results from survival analysis. *Psychiatric Quarterly, 68*(2). 117-29.

NASADAD. (1996). *A vision of the future of national substance abuse data systems.* Prepared for the Substance Abuse and Mental Health Services Administration's Office of Applied Studies. Washington, DC: National Association of State Alcohol and Drug Abuse Directors.

Office of Applied Studies. (1999). *Treatment Episode Data Set (TEDS) 1992-1997: National admissions to substance abuse treatment services.* Drug and Alcohol Services Information System Series S-7, DHHS Publication (SMA) 99-3324. Rockville, MD: National Clearinghouse of Alcohol and Drug Information.

Peterson, K.A., Swindle, R.W., Phibbs, C.S., Recine, B., & Moos, R.H. (1994). Determinants of readmission following inpatient substance abuse treatment: A national study of VA programs. *Medical Care, 32*(6). 535-550.

Richman, A. (1983). Cost-effectiveness analysis of alcoholism and drug abuse treatment programs: The relevance of recidivism and resource absorption. *Evaluation and Program Planning, 6*(1). 49-52.

Schmidt, L., Piroth, K., & Weisner, C. (1998). *Substance abuse and mental health treatment systems: The changing organization of service delivery and its implications.* Prepared for the Substance Abuse and Mental Health Services Administration, Office of Applied Studies. Berkeley, CA: Alcohol Research Group, Public Health Institute.

Schwartz, M., Mulvey, K.P., Woods, D., Brannigan, P., & Plough, A. (1997). Length of stay as an outcome in an era of managed care: An empirical study. *Journal of Substance Abuse Treatment, 14*(1). 11-18.

Simpson, D.D. & Savage, L.J. (1980). Drug abuse treatment readmissions and outcomes: Three year follow-up of DARP patients. *Archives of General Psychiatry, 37*(8). 896-901.

Simpson, D.D., Joe, G.W., Broome, K.M., Hiller, M.L., Knight, K., & Rowan-Szal, G.A. (1997). Program diversity and treatment retention rates in the Drug Abuse Treatment Outcome Study. *Psychology of Addictive Behaviors, 11*(4). 279-293.

SPSS Inc. (1997). *SPSS Advanced Statistics 7.5.* Chapter 10: Cox Regression. Chicago, IL: Author.

Thakur, N.M., Hoff, R.A., Druss, B., & Catalanotto, J. (1998). Using recidivism rates as a quality indicator for substance abuse treatment programs. *Psychiatric Services, 49*(10). 1347-1350.

U.S. Department of Commerce. 1999. United States Statistical Abstract 1998. Web page.

APPENDIX A:
CREATION OF AN ANALYTIC DATA FILE OF BASELINE TREATMENT ADMISSIONS

APPENDIX A:
CREATION OF AN ANALYTIC DATA FILE OF BASELINE TREATMENT ADMISSIONS

Colorado's Alcohol and Drug Abuse Division prepared a file of intake and treatment exit records for the NEDS contract that included data from January 1989 through February 1999. This file consisted of 509,089 entries to Colorado's treatment system, representing 219,203 unique individuals (the average client had 2.3 admissions to either detoxification, treatment, or both). Of these records, 2,560 were deleted due to invalid client identifiers and another 1,307 were deleted due to an apparently invalid admission year (1987 or 1988).

This report included only admissions to treatment services. Excluded are providers that only screen and evaluate clients and providers that only provide case management, detoxification, and psychiatric residential services. Also excluded is one small, highly specialized Short-term Intensive Residential Remediation treatment for offenders. This detoxification/treatment split was based solely on the type of treatment provider rather than on actual procedure codes or service codes. Records were deemed "treatment" if they were received from residential treatment (Therapeutic Community, Intensive and Transitional Residential) and outpatient treatment (Methadone and Non-methadone). Splitting treatment from detoxification cases left 98,972 admission records from 70,875 individuals. Of those, 232 records that appeared to be duplicates were dropped. Moreover, data were discarded if the admission years were 1987 and 1988. These were likely bad data.

The database was further divided into treatment records for a client's first experience in Colorado's publicly funded system, and records for second, third, fourth, and greater treatment episodes. Of these admissions, 70,755 admission records for the same number of clients who were dubbed "baseline admissions," and 16,791 "second" admissions, 5,980 "third" admissions, 2,527 "fourth" admissions, and 2,918 "fifth/sixth and greater" admissions.

Several changes were made to make DACODS consistent with a Federal standard client data set (now known as the Treatment Episode Data Set, administered by the Substance Abuse and Mental Health Service Administration's Office of Applied Studies). New variables were added in 1991 and old variables, such as client status at treatment exit, were changed.

One variable added in July 1991 is the number of prior substance abuse treatment episodes reported by clients at admission. From 1991 through 1998, 44 percent of clients reported they had at least one prior treatment episode. These episodes occurred in Colorado's public system in the

1980s or earlier, or perhaps in a private for-profit provider or a provider in another State's treatment system. Knowing whether a client's first encounter with the public system in Colorado is their first treatment ever provides valuable information about access and treatment utilization; accordingly, this report provides many contrasts between clients who have had prior treatment and clients who have not.

Due to the changes in the data file that occurred in July 1991, the database was further reduced to include those admissions that occurred between July 1, 1991, and February 28, 1999. This resulted in 54,049 admissions available for analysis.

APPENDIX B:
DETAILED LOGISTIC AND COX REGRESSION TABLES

APPENDIX B:
DETAILED LOGISTIC AND COX REGRESSION TABLES

EXHIBIT B-1
OVERVIEW OF VARIABLES ANALYZED IN THREE REGRESSION ANALYSES

Variable	Definition	Analysis		
		Drug/Alc Use (Exh. B-2, 3)	Drug/Alc Outcome (Exh. B4)	Readmis-sion (Exh. B-5)
Elapsed months between 7/91 and admission month	A continuous variable, counting the number of months between the start of the analysis period (July 1991=0) and the client's month of admission.	✔	✔	✔
Successfully completed treatment	Binary indicator where 1= successful treatment discharge status, 0=left after completing 99 percent or less of treatment.		✔	✔
Treatment duration	Continuous variable, counting the days between admission and treatment exit.		✔	✔
Age	Continuous variable in years.	✔	✔	✔
Female	Gender was coded into binary variable; 1=Female, 0=Male.	✔	✔	✔
Race/Ethnicity	Multilevel categorical variable, recoded into separate binary variables for non-overlapping racial/ethnic categories: African American, Native American, Hispanic, Other (including Asian) and white.	✔	✔	✔
Homeless at admission	Any current homeless status reported by client at admission.	✔	✔	✔
Disabled	Any disability reported by client at admission.	✔	✔	✔
Employed	Any full-time employment reported by client at admission, 1=Full Time, 0=Not Full Time.	✔	✔	✔
Any managed care	Client payment includes HMO/other managed care, 1=HMO, 0=Not HMO.			✔
Private pay	Private payment sources include self-pay, private insurance, employers; 1=Private Pay, 0=Not Private Pay.			✔
Counselor assessed problems, 0-6 possible	The sum total of subjective problem areas assessed by provider staff at admission, out of six possible problem areas (family, work, marital, social, legal, and physical), values range from 0 to 6.	✔	✔	✔
Number of prior detox	Continuous variable for number of self-reported detoxifications.	✔		

EXHIBIT B-1
OVERVIEW OF VARIABLES ANALYZED IN THREE REGRESSION ANALYSES (CONT.)

Variable	Definition	Analysis		
		Drug/Alc Use (Exh. B-2, 3)	Drug/Alc Outcome (Exh. B4)	Readmission (Exh. B-5)
Primary problem substance	Multilevel categorical variable for primary substance at admission, recoded into binary variables for heroin, methamphetamine or uppers, cocaine/crack, alcohol, or marijuana/hashish, analyzed in contrast to other drugs.	✔	✔	✔
Ever arrested	Binary variable for client self-report any prior arrests, ever.	✔	✔	✔
Maximum frequency of use at admission: 1-3x/month	Multilevel categorical variable on the maximum frequency across primary, secondary, and tertiary problem substance reported at admission.	✔	✔	✔
Maximum frequency of use at treatment exit	Multilevel categorical variable on the maximum frequency across primary, secondary, and tertiary problem substance reported at treatment exit. Values include 1-2 times per week, 3-6 times per week, and daily use; analyses are contrasted with no use during the period.			✔
Marital status	Multilevel categorical variable representing married, separated, divorced, never married. Analyses are relative to never married.		✔	
Modality	Multilevel modality variable recoded into binary variables (0/1) reflecting treatment in Therapeutic Communities, Intensive Residential, Transitional Residential, and Methadone; analyses are relative to Non-methadone Outpatient.	✔	✔	✔

BEST COPY AVAILABLE

EXHIBIT B-2
CHARACTERISTICS ASSOCIATED WITH ADMISSION PRIMARY DRUG PROBLEM AMONG FIRST TIMERS TO TREATMENT

	Alcohol	Marijuana/ Hashish	Cocaine/ Crack	Heroin	Methamphetamine/ Uppers
Cox & Snell R^2	.17	.19	.14	.24	.05
Nagelkerke R^2	.22	.29	.26	.70	.17
Predictor Variable	**Odds Ratios**				
Elapsed months from 7/91 to admission month	0.99	1.01	ns	ns	1.02
Adult	2.2	.18	16.89	5.52	3.14
Female	ns	.55	1.73	ns	1.89
African American	0.57	1.20	3.88	ns	0.03
Native American	1.93	ns	0.50	ns	0.4
Hispanic	1.09	ns	1.48	1.93	0.31
Other racial/ethnic minorities	ns	1.47	1.68	ns	0.33
Homeless	1.17	0.65	ns	ns	ns
Any disability	1.2	0.85	0.84	0.55	ns
Full-time employment	1.23	0.80	1.10	ns	.079
Staff assessment of problems (0-6 possible)	0.84	1.07	1.16	ns	1.20
Ever arrested	1.24	ns	0.67	ns	1.16
Modality (relative to Non-methadone Outpatient)					
Therapeutic Community	0.13	0.78	5.47	11.15	2.53
Intensive Residential	0.57	.087	2.37	2.85	1.60
Transitional Residential	0.84	.048	2.08	2.94	ns
Methadone	0.01	.03	0.11	630.77	0.12
Prior detox	1.57	0.47	0.87	ns	0.60

Note: See Exhibit B-1 for a definition of variables. Data are based on 25,073 cases with valid and non-missing data. Approximately 12 percent of cases had missing data in one or more variables, resulting in their exclusion from these models. To interpret results: odds ratios are displayed, where a value greater than 1 indicates clients are more likely to report that drug; odds less than one mean clients are less likely to report that drug. A "ns" means there was no statistically significant relationship. Only relationships significant at the .05 level are presented—though virtually all relationships were significant at the .001 level.

EXHIBIT B-3
CHARACTERISTICS ASSOCIATED WITH ADMISSION PRIMARY DRUG PROBLEM AMONG NON-FIRST TIMERS TO TREATMENT

Predictor Variable	Alcohol	Marijuana/ Hashish	Cocaine/ Crack	Heroin	Methamphetamine/ Uppers
Cox & Snell R^2	0.24	0.18	0.14	0.35	0.05
Nagelkerke R^2	0.33	0.32	0.24	0.69	0.16
Elapsed months from 7/91 to admission month	0.99*	1.01	1.00	1.00	1.02
Adult	3.08	0.10	12.68	11.15	2.75
Female	0.75	0.54	1.74	ns	1.59
African American	0.42	0.81	5.77	ns	0.04
Native American	2.51	0.67	0.47	ns	0.48
Hispanic	1.15	0.89	1.37	2.42	0.29
Other racial/ethnic minorities	ns	ns	1.90	2.61	ns
Homeless	1.19	0.78	ns	ns	ns
Any Disability	1.20	ns	0.72	0.69	ns
Full-time employment	1.17	0.81	ns	0.83	0.83
Staff assessment of problems (0-6 possible)	0.92	0.95	1.12	ns	1.10
Ever Arrested	1.26	ns	0.75	0.84	ns
Modality (Relative to non-methadone outpatient)					
Therapeutic Community	0.19	0.91	3.77	4.13	2.66
Intensive Residential	0.67	0.93	1.78	1.60	1.41
Transitional Residential	ns	0.56	1.64	ns	0.70
Methadone	0.01	0.01	0.05	253.79	0.05
Prior Detox	1.46	0.57	0.82	ns	0.73

Note: See Exhibit B-1 for a definition of variables. Data are based on 19,345 cases with valid and non-missing data. Approximately 14 percent of cases had missing data in one or more variables, resulting in their exclusion from these models. To interpret results: odds ratios are displayed, where a value greater than 1 indicates clients are more likely to report that substance; odds less than one mean clients are less likely to report that substance. An "ns" means there was no statistically significant relationship.

* Only relationships significant at the .05 level are presented—though virtually all relationships were significant at the .001 level.

BEST COPY AVAILABLE

EXHIBIT B-4
LOGISTIC REGRESSION OF FACTORS ASSOCIATED WITH REDUCED USE AND NO USE OF DRUGS OR ALCOHOL AT TREATMENT EXIT

	First Timers				Non-First Timers			
	Reduced Use		No Use		Reduced Use		No Use	
Cox & Snell R^2	0.199		0.255		0.203		0.276	
Nagelkerke R^2	0.285		0.352		0.318		0.399	
Sample size	16616		17111		12865		13273	
Variable	**Sig**	**Odds**	**Sig**	**Odds**	**Sig**	**Odds**	**Sig**	**Odds**
Ttmt duration (days)	0.0000	1.002	0.0000	1.001	0.0000	1.001		
Successfully completed tx	0.0000	2.803	0.0000	3.034	0.0000	4.743	0.0000	4.778
Primary substance								
Heroin	0.0753	0.741	ns		ns		0.0047	0.674
Other opiates	ns		ns		ns		ns	
Alcohol	0.0000	0.749	ns		0.0021	0.816	ns	
Methamph/Upper	ns		ns		ns		ns	
Cocaine/Crack	ns		ns		ns		ns	
Marijuana	ns		ns		0.0017	0.766	0.0000	0.756
Female	ns		ns		ns		ns	
Age	0.0000	1.017	0.0000	1.023	0.0687	1.006	0.0000	1.016
African American	0.0129	0.861	ns		0.0138	0.827	0.0627	0.874
Native American	ns		ns		ns		ns	
Hispanic	0.0000	0.787	0.0004	0.862	0.0431	0.884	0.0547	0.893
Modality (Rel. to Non-methadone Outpatient)								
Therapeutic community	0.0000	7.018	0.0000	7.710	0.0000	3.593	0.0000	5.356
Intensive residential	0.0000	3.706	0.0000	4.344	0.0000	8.287	0.0000	8.777
Transitional residential	0.0000	5.043	0.0000	4.372	0.0000	3.127	0.0000	2.515
Methadone	0.1794	0.797	0.0000	0.401	0.0000	0.496	0.0000	0.373
Marital status, relative to never married								
Married	0.0004	1.238	0.0000	1.419	0.0036	1.227	0.0018	1.231
Widowed	0.2752	1.283	0.2485	1.288	0.8373	0.960	0.3139	0.820
Separated	0.1323	1.133	0.0637	1.159	0.0064	1.289	0.0036	1.289
Divorced	0.7888	1.019	0.5627	1.040	0.1725	1.105	0.6740	1.029

BEST COPY AVAILABLE

EXHIBIT B-4 (CONT.)
LOGISTIC REGRESSION OF FACTORS ASSOCIATED WITH REDUCED USE AND NO USE OF DRUGS OR ALCOHOL AT TREATMENT EXIT

	First Timers				Non-First Timers			
	Reduced Use		No Use		Reduced Use		No Use	
Variable	Sig	Odds	Sig	Odds	Sig	Odds	Sig	Odds
Counselor assessed problems (0-6 possible)	ns		0.0074	1.034	ns		0.0015	0.954
Employed	ns		ns		ns		0.0903	1.087
Homeless	0.0187	0.788	ns		ns		ns	
Admission max. drug/alcohol freq.								
1-2 times/month	0.0000	0.096	0.0000	0.103	0.0000	0.156	0.0000	0.163
1-2 times/week	0.0000	0.116	0.0000	0.092	0.0000	0.207	0.0000	0.166
3-6 times/week	0.0000	0.136	0.0000	0.097	0.0000	0.274	0.0000	0.189
Daily	0.0000	0.132	0.0000	0.085	0.0000	0.245	0.0000	0.166
Elapsed months between 7/91 and admission month	0.0598	0.998	ns		0.0079	0.997	0.0000	0.995

Note: See Exhibit B-1 for a definition of variables. Data are based on 30,384 clients with valid and non-missing data on admission and discharge substance use and other variables. More than 40 percent of possible cases were excluded due to missing data, most notably to missing discharge data. To interpret results: odds ratios are displayed, where a value greater than 1 indicates that clients are more likely than the reference group to reduce or eliminate drug or alcohol use. An "ns" means there was no statistically significant relationship. Only relationships significant at the .05 level are presented.

EXHIBIT B-5
COX PROPORTIONAL HAZARDS REGRESSION OF FACTORS ASSOCIATED WITH CLIENTS' RETURN TO TREATMENT

	Sig	Odds Ratio
Elapsed months between 7/91 and admission month	0.001	0.997
Successfully completed treatment	0.000	0.710
Treatment duration (days)	0.000	1.000
Age	0.000	0.992
Female	ns	ns
African American	0.000	1.270
Native American	ns	ns
Hispanic	0.008	1.106
Other Race/ethnicity	ns	ns
Homeless at admission	ns	ns
Disabled	ns	ns
Employed	ns	ns
Any managed care	ns	ns
Private pay	0.000	0.673
Counselor assessed problems, 0-6 Possible	0.000	1.038
Primary problem substance		
Heroin	0.004	1.294
Methamph/uppers	ns	ns
Cocaine/crack	ns	ns
Alcohol	0.000	0.697
Marijuana	0.000	0.796
Ever Arrested	0.000	1.180
Maximum frequency of use at admission: 1-3x/month	0.022	0.888
1-2x/week	0.155	0.922
3-6x/week	0.963	1.003
Daily	0.243	1.055
Maximum frequency of use at treatment exit: 1-3x/month	0.002	1.177
1-2x/week	0.163	1.101
3-6x/week	0.165	1.109
Daily	0.067	1.114
Modality (Rel. to Non-methadone Outpatient)		
Therapeutic community	0.032	0.813
Intensive residential	0.000	1.259
Transitional residential	0.447	1.050
Methadone	0.005	1.321

Note: See Exhibit B-1 for a definition of variables. Data are based on 24,274 client records with valid, non-missing data for all variables. To interpret results: odds ratios are displayed, where a value greater than 1 indicates that clients are more likely than the reference group to reduce or eliminate drug or alcohol use. An "ns" entry means there was no statistically significant relationship. All variables retained in models are displayed.

BEST COPY AVAILABLE